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MIDDLE EAST UNIVERSITY
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The Impact of Big Data on Business Intelligence: A Field Study on Jordanian Telecommunication Companies

أثر البيانات الضخمة على ذكاء الاعمال :دراسة ميدانية في شركات الاتصالات الأردنية

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Authorization

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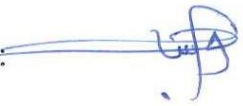
Signature: 

Committee Discussion and Decision

This thesis of the student Wesam Ibrahim Nafi, which studied **"The Impact of Big Data on Business Intelligence: A Field Study on Jordanian Telecommunication Companies"**, has been defined, accepted, and approved on 2th of June 2018, by the following committee member:

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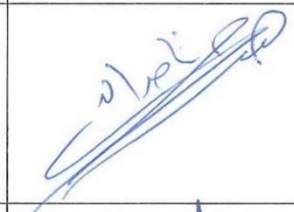
1	Prof. Heba H. O. Nasereddin	Supervisor and Head of committee	
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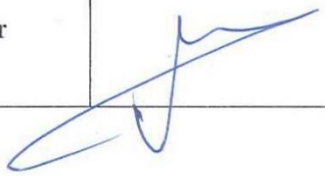
3	Prof. Mohammed Abu Zaid	External Examiner	

Acknowledgment

الدكتورة/ هبة ناصر الدين . . .

تعجز الكلمات عن وصفك ، ولا أجد أمام عطائك الكبير لنا ما أعبر لك عنه ، فلقد كنت لنا منبرا للعلم ، ونهرا لا ينضب ، وحبا لنا ، لقد أخذتي بيدي بكل خطوة خطوتها برسالتي ، ولم تبخلِ بوقتك علي ، تعلمت منك الكثير خلال رحلتي العلمية بالتحضير للماجستير ، تعلمت منك متى أقسو على نفسي لأنجز عملي بدقة ، وكيف أنظم وقتي وعملي ، وأن لا تفارقني الابتسامة أبدا وحتى وأنا في ذروة تعبي ، فهي مصدرا لتخطي العقبات والصعوبات التي واجهتي ، وعلي أن أتخطى كل ما قد يعيق رسالتي ، فنحن نحمل أسمى رسالة هي رسالة العلم التي سنرتقي بها بمجتمعنا الذي يستحق منا الكثير ، تعلمت منك معنى التواضع وكيف أثق بقدراتي ، تعلمت منك الكثير . . . اشكرك .

صديقاتي . . .

أحلام سالم، وزين العدوان

شكرا لصداقة تزدان بالعلم، لعطائكما ووقوفكما بجانبي، شكرا لكما

الباحثة: وسام نافع

Dedication

لمن كانت مصدرا لقوتي كلما حاول الضعف التسلسل إلى نفسي . . .

لمن كانت وراء طموحي ، وتحقيق أحلامي . . .

إلى واقعي الجميل . .

وحلمي الذي تحقق . .

إلى تلك النظرة التي روت تفاؤلي وإيجابيتي في الحياة . .

وعلمتني أننا نحن من نرسم واقعنا الذي نحبه ونرضاه ، ونزين حياتنا بباقات ورد ربيعية ، بالزرع الذي نزرعه . . .

وأن أجمل قطف نقطفه هو ثمار النجاح . . .

وها أنا اليوم أقف وبداخلي شعور جميل تعجز الكلمات عن وصفه، أناقش رسالتي بالماجستير، لأهديك يا أمي رسالتي وتفوقي بها . . . . .

أبي . . . . يا من كانت قوتك وثباتك في هذه الحياة هي قوة وثباتا لي، يا من كنت مثلا أحتذي به، وقدوة أسعى كي أكون مثلها . . . أهديك نجاحي وتفوقي في كل دروب حياتي . .

إخواني وأخواتي . . . لن أنسى مساندتكم لي، ووقوفكم إلى جانبي، وتشجيعكم المستمر لي . . . .

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The Impact of Big Data on Business Intelligence: A Field Study on Jordanian Telecommunication Companies

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Abstract

This study aims to investigative the impact of Big Data on Business Intelligence in Jordanian telecommunication companies. In order to achieve the objectives of this study, the data were collected through answering questionnaires by using simple random for a sample whose size is 312 employees who are working at Jordanian telecommunication companies (Zain, Orange and Umniah). Furthermore, the researcher applied the Statistical Package of Social Science (SPSS) for analytical and descriptive statistics. Additionally, to answer the research questions, the study used frequencies, means, standard deviations, and Cronbach's Alpha test to examine the consistency and reliability of the data collection tool. The study concluded that there is impact of Big Data on the Business Intelligence in the Jordanian telecommunication companies. Moreover, the results show that there is a strong impact among Big Data (Volume, Velocity, and Variety) on Business Intelligence (Organizational, Process, and Technology).

Finally, the thesis recommends the telecommunication companies to be more support for their Big Data analytics tools since it would help the companies to discover the hidden knowledge from the massive data and to start to adapt using Big Data analytics in order to survive in the digitalized and dynamic markets.

Keywords: Decision-making, Volume, Velocity, Variety, Organizational, Process, Technology.

أثر البيانات الضخمة على ذكاء الاعمال: دراسة ميدانية في شركات الاتصالات الأردنية

إعداد

وسام ابراهيم نافع

إشراف

الأستاذ الدكتور هبة حسن ناصر الدين

الملخص

هدفت هذه الدراسة إلى بحث **أثر** البيانات الضخمة على ذكاء الأعمال في شركات الاتصالات الأردنية. ولغرض تحقيق أهداف هذه الدراسة تم تطوير الاستبانة لجمع البيانات بطريقة عشوائية بسيطة على عينة تكونت من 312 موظفا يعملون في شركات الاتصالات الأردنية (زين، أورانج، أمنية). تم اختبار فرضيات الدراسة باستخدام وسائل الإحصاء الوصفي والتحليلي باستخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية (SPSS) .وللإجابة على أسئلة البحث ، استخدمت الدراسة الترددات والوسائل والانحرافات المعيارية واختبار كرونباخ ألفا لفحص اتساق وموثوقية أداة جمع البيانات. خرجت هذه الدراسة بمجموعة من نتائج كان أهمها: وجود أثر للبيانات الضخمة على ذكاء الأعمال في شركات الاتصالات الأردنية. بالإضافة إلى وجود أثر قوي بين البيانات الضخمة (الحجم، السرعة، التنوع) على ذكاء الأعمال (التنظيمية، العملية، والتكنولوجيا).

وخرجت من هذه الدراسة بمجموعة من التوصيات كان أبرزها: أن تدعم الشركات أدوات تحليل البيانات الضخمة الخاصة بهم لتساعد في اكتشاف المعرفة الخفية. كما توصي الدراسة شركات الاتصالات البدء في التكيف في استخدام تحليلات البيانات الضخمة من أجل البقاء في الأسواق الرقمية والديناميكية.

الكلمات المفتاحية: صنع القرار، الحجم، السرعة، التنوع، التنظيم، العمليات، التكنولوجيا.

Chapter One

General Framework

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1.2 Study Problem

1.3 Study Objectives

1.4 Study Significance

1.5 Study Questions and Hypothesis

1.6 Study Model

1.7 Study Limitations

1.8 Study Delimitations

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Chapter One

1.1 Introduction

Nowadays, data has become expanded wide that forced organizations to invest further in the new Information Technology infrastructures. Skillful data scientists have manage the Big Data issues. However, the quick growth of Big Data property in multiple domains such as: electronic commerce, government, finance institution, insurance and medical, also it has created better gain vision and opportunity that transformation into knowledge discovery and value creation (Wamba et al., 2015).

In another hand, Big Data is expected to lead to shift in various aspects in the organization. For instance, a shift in thinking about data infrastructure, Business Intelligence and information strategy is expected to analyze this data (Fiaz et al., 2016). The main difference between Big Data and other information technologies is that Big Data is not only about accessing or saving data, but it is also about analyzing this data (Bello-Orgaz et al., 2016).

Moreover, Business Intelligence in organizations has become not only a significant technology for enhancing business performance, also its helps to developed e-commerce and e-services. However, Business Intelligence has established widespread inattention in academia and business. On the other hand, Business Intelligence is facing new challenges and opportunities since development of Big Data and technologies (Sun et al., 2015).

In Addition, Business Intelligence has become the art of sift through large amounts of data; extract pertinent information that converted information into knowledge (Babu, 2012).

Out of using Big Data, organizations will be able to deal with significant in the environment of organizations, and have the ability to transference knowledge, which can enhance decision making and performance (McAfee & Brynjolfsson, 2012). While Big Data is still a trend, individuals employ Big Data as "catch-phrase" to clarify huge amount of information which is not easy to process by traditional database or traditional software techniques (Padberg, 2015). Generally, Big Data requirements has developed before it gets a value, and Big Data becomes one the assets in the organization (Padberg, 2015). According to Adrian et al., 2016, The primary to understand the Big Data its shown from their characteristics from the "3Vs" (Volume, Velocity, and Variety) which is difficult for an organization to analyze, manage, and extract value, also its difficult to use traditional systems and methods.

As Well as, Big Data is the buzzword in current days around the world. As there is a huge data generated by different sources such as social media , marketing, engineering, education, medicine, business people, telecommunication and web logs. As well as, Big Data assists the companies to gain insights in order to assists decision making for achieving their business goals. Business Intelligence could play an essential role in enhancing organizational performance by improving decision making processes. Big Data and Business Intelligence enhance sales and customer data into valuable information. Little research exists on the impact of the use of Big Data on business intelligence. This study fills this gap in knowledge by investigative the impact of Big Data on Business Intelligence in Jordanian telecommunication companies.

Furthermore, the recent research aim to investigate the impact of Big Data on Business Intelligence is mostly focus on the challenges and benefits of Big Data and Business

Intelligence. Moreover, the researcher realizes the importance of Big Data on the success of organizations and the important to enhance the Business Intelligence. As a final point, the current study is trying to investigate the impact of Big Data characteristics such as: Volume, Velocity, and Variety, in the Jordanian telecommunications companies (Zain, Orange, Umniah) and its impact on Business Intelligence factors, such as: Organizational, Process, and Technology.

The thesis is structured as the following: First, the thesis shows varied literature review, focusing on Business Intelligence and Big Data, and then it suggests a consequent hypotheses and conceptual model. The methodology, data analysis, and results are consequently presented. Finally, the thesis presents the discussion of the findings and results.

1.2 Study Problem

Big Data and Business Intelligence are concepts that are used in most organizations to create a competitive advantage. However, Big Data and analytics are becoming gradually more important for several reasons. First of all, data is available everywhere and storing data is becoming cheaper. Also, the tools of data are easier to use because it is can make the analysis simpler, however there are techniques to show and present massive volume of data that makes processing power more quicker (Langloisa & Chauvela, 2017).

In the light of the previous discussion and the increased adoption of Big Data in organizations, many Jordanian organizations require the integration between Big Data and Business Intelligence. Also, many organization does not recognize the impact of Big Data on Business Intelligence and how organizations can be developed by integrating the Big

Data characteristics such as: Volume, Velocity, and Variety, on Business Intelligence factors such as: Organizational, Process, and Technology. Therefore, this study is explored how an organization could start with Big Data and how it could optimize the current Business Intelligence processes. However, the researcher chooses the telecommunication companies since it depends on the technology. In addition, there are few researches and literatures that study the impact of Big Data on Business intelligence in the telecommunication sector in Jordan. Therefore, this study is dedicated to investigate the impact of Big Data on Business Intelligence in Jordanian telecommunication sector as its one of the major profitable sectors in Jordan.

The main problem of this thesis is:

"Does Big Data Impact Business Intelligence? And to what extend does the Big Data impact Business Intelligence?"

1.3 Study Objectives

The current study seeks to investigate the impact of Big Data on Business Intelligence at Jordanian Telecommunication Companies, by:

- Investigate the impact of Big Data (Volume, Velocity and Variety) on Business Intelligence (Organizational, Process and Technology).
- Investigate the impact of Big Data Volume on Business Intelligence (Organizational, Process and Technology).
- Investigate the impact of Big Data Velocity on Business Intelligence (Organizational, Process and Technology).

- Investigate the impact of Big Data Variety on Business Intelligence (Organizational, Process and Technology).

1.4 Study Significance

The significant of this study is to demonstrate the impact of Big Data on Business Intelligence at Jordanian Telecommunication Companies. Big Data is evaluated measured in the terms of independent variables such as (Volume, Velocity and Variety) and determine the impact of dependent variables of Business Intelligence such as (Organizational, Process and Technology), that is assist the organization to be more aware of implementing the Big Data on Business Intelligence on the future, also it is assist to understand what is Big Data and how it is important for organizations.

All previous studies examined the Business Intelligence from different variables. In contrast, this study is the first (according to researcher's knowledge) thesis which examines the Business Intelligence from the entrance of Big Data in business organizations, specifically at telecommunication companies in Jordan.

On the other hand, telecommunications companies have a unique advantage in the modern marketplace by controlling the communications infrastructure; they have more data than any other industry on where their customers are, how they interact, and how they transact business.

1.5 Study Questions and Hypothesis

The Thesis Hypothesis of this thesis with relation to the research questions are formulated as the following:

Study Questions:

- Is there impact of Big Data (Volume, Velocity, and Variety) on Business Intelligence (Organizational, Process, and Technology)?
- Is there impact of Big Data Volume on Business Intelligence (Organizational, Process, and Technology)?
- Is there impact of Big Data Velocity on Business Intelligence (Organizational, Process, and Technology)?
- Is there impact of Big Data Variety on Business Intelligence (Organizational, Process, and Technology)?

Study Hypothesis:

According to the research questions, the following hypotheses are formulated as follows:

- **Main Hypotheses:**

H_{o1}: There is no impact of Big Data (Volume, Velocity, and Variety) on Business Intelligence (Organizational, Process, and Technology), at the level of significance ($\alpha \leq 0.05$).

- **Sub-Hypotheses:**

$H_{o1.1}$: There is no impact of Big Data Volume on Business Intelligence (Organizational, Process, and Technology), at the level of significance ($\alpha \leq 0.05$).

$H_{o1.2}$: There is no impact of Big Data Velocity on Business Intelligence (Organizational, Process, and Technology), at the level of significance ($\alpha \leq 0.05$).

$H_{o1.3}$: There is no impact of Big Data Variety on Business Intelligence (Organizational, Process, and Technology), at the level of significance ($\alpha \leq 0.05$).

1.6 Study Model

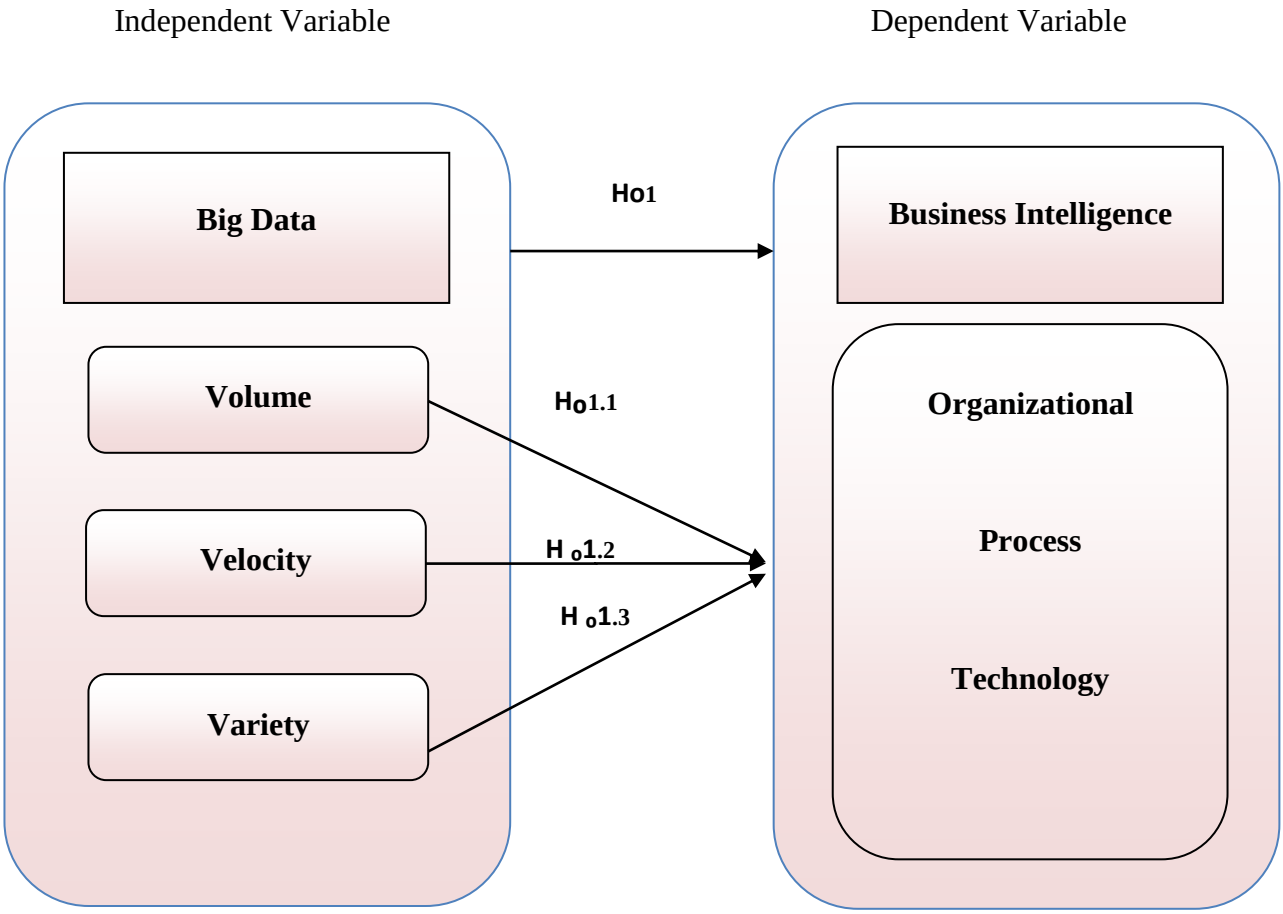

Figure (1-1): Study model.

Source: prepared by the researcher based on:

- **Independent variable**:
  a. Havakhor (2016).
  b. Ashraf (2017).

- **Dependent variable**:
  a. Rosedahl J. L. (2016).
  b. Adamala & Cidrin (2011).

1.7 Study Limitations

The thesis contains several Limitations which includes the following:

- **Human Limitations:** The sample size of this study is considered as a large sample size; therefore it is predestined to be round 312 respondents.
- **Time Limitations:** This study was carried within the period between the first semester and the second semester of academic year 2017/2018.
- **Study Measurement Limitations:** Through this study the researcher hopes to use the right measurements and scales to collect data, so the researcher did her best to choose the right measurements that exactly represent the variables of the study.

1.8 Study Delimitations

The thesis contains several Delimitations which includes the following:

- **Human Delimitations:** The scope of this study was carried out on the staffs at Jordanian telecommunication companies.
- **Place Delimitations:** This study was carried on the Jordanian telecommunication companies (Zain, Orange and Umniah).
- **Time Delimitations**: The time is limited to the academic year of 2017-2018.
- **Scientific Delimitations:** This study was determined the impact of Big Data on Business Intelligence and adapt the prior's studies recommendations.

1.9 Study Conceptual Definitions

Big Data (BD): is the collection of data from digital and traditional sources inside and outside an organization that represents a source for ongoing analysis (Arthur, 2013).

Business Intelligence (BI): is refers as providing decision makers with important knowledge and information by leveraging a variety of sources of data with structured and unstructured information and it is define to as a gathering of technologies and information systems (IS) that support managerial decision makers of operational control by providing information on internal and external operations (Sun et al., 2015).

Volume: Large volume of data that either consume huge storage or consist of large number of records (Sen et al., 2016).

Velocity: which means speed or rapidity and it indicates that Big Data is created or produced very fast and constantly (Silahtaroğlu & Alayoglu, 2016).

Variety: Variety specifies the various types of data. Data can be from diverse types of sources e.g. social media, social networks, e-mail, and text streams (Puang-Ngern, 2015).

Chapter Two

Theoretical Framework and Previous Studies

2.1 Theoretical Framework.

2.1.1 Big Data.

2.1.2 Key Characteristics of Big Data.

2.1.3 Business Intelligence.

2.1.4 Business Intelligence Factors.

2.1.5 The relationship between Big Data and Business Intelligence

2.2 Previous Studies.

2.2.1 Difference between Current Study and Previous Studies.

Chapter Two

This chapter presents the previous relevant studies and literature review that are related to Business intelligence and Big Data.

2.1 Introduction

This section discusses all about the Big Data, Key Characteristics of Big Data, Business Intelligence and the factors Business Intelligence.

2.1.1 Big Data (BD):

Big Data is a group of data gathered from various sources and various formats such as: image, text, and voice. These data can be gathered from social media such as: Facebook, Twitter, Instagram, and blogs on the Internet. Also, though Big Data is can be huge in size such as: petabytes and terabytes. However, Big Data has five features: Value, Veracity, Variety, Velocity, and Volume, is generally represented as "5Vs" of Big Data (Vardarlıer & Silahtaroğlu, 2016).

According to Boyd & Crawford (2012) they defined Big Data as a technological, cultural, scholarly phenomenon that rests on the interplay of technology, analysis, and methodology. As argued by Madden (2012) Big Data indicates that the data is too fast, too bigger, or too hard for current tools to process. Big Data also refers to "3Vs" Volume, Variety, and Velocity; which Volume refer to the huge amount of data, Variety refer to the speed of data creation, and Velocity refer to the growth of unstructured data (McAfee & Brynjolfsson, 2012).

In defining Big Data, it is essential to understand the mix of unstructured and multi structured data that contains the volume of information.

Unstructured data refers to the information that is not organized by data models or traditional databases. Good examples of unstructured data are Metadata, Twitter tweets, and other social media posts.

Multi-structured data refers to a variety of data types and formats that can be derived from interactions between people and machines, such as social networks and web applications. A good example is web log data, which includes a combination of visual images and text along with structured data like transactional information or form. Multi-structured data will continue to develop when digital disruption transforms interaction and communication channels and when marketers promote the customer experience across web properties, devices, social platforms and face-to-face interactions (Arthur, 2013).

For McAfee & Brynjolfsson (2012) Big Data is now becoming recognized broadly and it has a lot of opportunities, which provided a "getting started" that guided for implementing Big Data in the organization, in the beginning it should create a team and to select a test department with a friendly and open-minded manager.; the team should choose one data scientist and should not contain more than five employees. After that, should have a meeting, brainstorm session, and choice not more than five opportunities to have the ability to solve with Big Data within five weeks. However its require beginning with innovation process as the following steps: measurement, experimentation, sharing and replication. Finally, if is possible that organization could send out some analytic challenges on their Big Data to the third parties.

2.1.2 Key Characteristics of Big Data

This section includes the actual 3Vs of Big Data, the three attributes of Big Data, are:

A. Volume:

The first character for the "3Vs" is the volume of data which is available from the web that has dramatically increased, due to technologies such as data streaming, and everyday activities such as: sending text messages, photos, and videos.

In addition, data from supply chain applications have possibility to make each stage in a product's drive visible. Also, the volume of data that is produced inside organizations will continue to develop, if the organization use in their work computers to manage their daily operations and involve in data collection to enhance these activities (Hendler, 2013).

However, traditionally data sets have been in the megabytes and gigabyte range. Also, traditional enterprise volume has come from data that being stored into relational database management systems. Primarily due to newer volumes and internet technologies are becoming from non-traditional areas, log files have being stored in permanent data stores instead of being archived off or deleted (Nair, 2012).

According to Cai & Zhu (2015), the Volume refers to the tremendous volume of the data. We usually use TB or above magnitudes to measure this data volume.

Also, the volume of data has grown from terabytes (10^{18}) bytes of information towards zettabytes (10^{21}) bytes (Coninck, 2017).

B. Velocity

Velocity refers to the speed of data that's being produced and the speed of data that must be analyzed to meet demand. New technologies and procedures need to be used to process the data when the data is being produced faster than it can be analyzed. Legacy systems have mainly processed data in batch. Current trends using Internet technologies have started to process data while it gathered into the system, for example, streaming data analytics. Streaming data analytics offers challenges for even the further popular data analytics infrastructure framework (Gartner, 2011).

According to Kimble & Milolidakis (2015), Velocity refers to the rate at which that stock changes, such as, the frequency at which it is updated, the speed at which data is generated or the rate at which it is delivered. Examples of high Velocity data consist of real time data from sensors and video cameras, click stream data generated by visitors to online stores and financial data from stock markets. In intense cases, for instance streamed data, both the delivery and generation of data is, continuous, effectively.

In addition, Velocity is the V that makes the 3V-model complete. Needless to say, this is an essential part of Big Data also, while time is money in the business world. The data is produced in real time and needs to be processed as quickly as possible so as to be competitive at times. Therefore, not only the Velocity of the incoming data is essential, but also the speed of the feedback loop. The time spent on data instream from decision-making needs to be small (Coninck, 2017).

C. Variety

For Data Variety is the mixture of data. Traditionally data and mainly operational data is structured converted into database based on the types of data, for example: floating point, numeric, character, etc., the sources of data have thriven beyond operational applications, also, data has increasingly become unstructured data, which includes: regularly, text, audio, video, image, geospatial, and Internet data (Minelli et al., 2012).

However, data is in actuality "Semi-structured" as many as sources of data which are programmed. The "Semi-structured" data is defined by (Minelli et al., 2012) as a mixture of diverse types of data that include some pattern or structure, for example call center logs might include customer data from all call as well as complaint where the complaint information is unstructured and difficultly synthesized into a data store. In addition, the data variety of sources is increasing, such as internal operational focused systems with customer relationship management (CRM) applications were the vital data source used in analytic processing enterprise resource planning (ERP).

Furthermore, Variety represents that data to become in numerous forms, users can share, posts, text contents, pictures, videos and other links. Data is able to be generated by reports, temperature sensors and productivity logs (Fekete, 2015). As argued by Wang & Alexander (2015) Variety means the increased of types of data disparity to instance Semi-structured data from "key-value web" clicks, also,

structured data structured from relational tables, unstructured data become from networking data, streamed video and audio.

There are additional V's that has been mentioned recently together with Big Data; They are: Value, Variability and Veracity (Wang & Alexander, 2015)**:**

In brief, Value means that there is several valuable information-golden data to extract inside the collected data, although for the most part of the pieces of data individually might appear valueless.

However, Variability refers to the data changes in lifecycle and processing. Increasing variability and variety as well increases the potentiality in providing unexpected and the attractiveness of data, valuable and hidden information.

Otherwise, Veracity includes two aspects the data trustworthiness and the data consistency. The following aspects assist to ensure veracity of data (Wang & Alexander, 2015):

• Trusted origin and data authenticity.

• Linked data and Integrity of data (e.g., for complex distributed data, hierarchical data).

• Storage and computer platform trustworthiness.

• Identification of both source and data.

• Reputation and accountability.

• Timeliness and availability.

2.1.3 Business Intelligence

Numerous researchers discussed about Business Intelligence definitions in various ways; Madsen (2012), defined Business Intelligence as the combination of data from diverse source systems to encourage business usage by using friendly tools.

Briefly, Business Intelligence means the applications, technologies, and processes for evaluating and accessing data to allow end users to take good business decisions (Wixom et al., 2011).

As defined by Kimble & Milolidakis (2015) Business Intelligence is the capability of an organization to make expressive use of existing data. Business Intelligence includes a diversity of areas such as product intelligence, customer intelligence, strategic intelligence, competitor intelligence, market intelligence, business counter intelligence and technological intelligence. Though, Business Intelligence is frequently synonymous with technology, Business Intelligence also covers the processes, technologies and people that turn data into visions that further drive business action and decisions.

However, Corporations with initiative Business Intelligence capabilities generate a solid foundation of integrated, practical, and high-quality data. This data is then form to the right people and carried out at the right time by several analytical tools including query, reporting, and advanced analytics software. Business employers observe visions from the decisions making, data, and solve important business issues, which further leads to actions that cause an extensive range of both tangible and intangible business value (wixom et al., 2013).

As well, Business Intelligence is considered as a strategic management tool and is one of the quick growing areas of the business. Similarly, competitive intelligence is one of the important techniques in producing competitive advantages and causes to targeted observation of strategic decisions at the competitive environment for competing and activating n the organization (Bahrami et al., 2012).

In addition, the power source of organizations has moved from tangible to intangible resources, and presently organizations are extra lined by information, knowledge, intellectual, and capital intelligence. A vital component for an organization's achievement is the ability to take profit of the adjacent information. Business Intelligence seems to be the driver for business accomplishment for several organizations (Olszak C. M., 2016).

Moreover, the profit of Business Intelligence is extraordinary. Business Intelligence can predict future trends, promote internal coordination, hurriedly provide valued information to managers, and enable a quick response to external and internal issues. Classifying new opportunities and implementing an effective strategy can provide businesses with a competitive market advantage and long-term stability (Wang M. , 2013).

As well as, Business Intelligence has the potential to produce both operational and strategic value by mixing organizational information to support decisions at numerous levels of the business (Yogev et al. 2013).

2.1.4 Business Intelligence Dimensions

The three common Dimensions of Business Intelligence are:

A. Organizational

The organizational factor is separated into vision and business-related aspects, challenge related aspects and management. Additionally, the organizational factor also contains culture and strategy related factors. As well as, the Business Intelligence plan have to be designed to uncover a lot of issues that are worldwide in the whole organisation and should situated below the authority of senior managers (Yeoh & Koronios, 2010).

However, the decision to be applicable Business Intelligence systems is ready at an organizational level in regards to the organizational requirements other than the effectiveness and eventually the success of Business Intelligence is frequently influenced on a more individual level (Persson, 2017).

Besides, the organizational factor of Business Intelligence system implementation consists of business and vision case factors. Also to the definition of Hirsimäki 2017, the organizational factor also consists of culture and strategy factors. In addition to, the most mentioned CSFs from this category were well established business case and clear vision and committed management support and sponsorship, understanding of organisational culture.

B. Process

The process dimension is divided into project management related factors, methodology related factors, team related factors, and change management related factors (Yeoh & Koronios, 2010). Whereas Business Intelligence is typically linked with evolving reports and generating executive scorecards, Business Intelligence is regularly involving changes to daily processes and routines. It includes technical complexities, cross-functional teams, and broader departmental challenges.

Moreover, investing in a Business Intelligence solution needs an important modification to the organizational environment and culture. Therefore, understanding the main components of the process dimension is essential in improving Business Intelligence adoption rates and to Business Intelligence success (Rosedahl J. L., 2016).

According to Koronios and Yeoh (2010), the process dimension of the CSFs in Business Intelligence system implementation includes of factors related to the team, change management, and project management.

In addition, the most discussed and mentioned CSFs from this category were suitable team skills, user training and support, and user-oriented change management. As well post-implementation related processes and project management related factors belong to this category in addition to implementation strategies and business-driven development approach (Hirsimäki, 2017).

C. Technology

Technology context contains the associated technology inside and outside of the enterprise, for instance processes and equipment (Angeles, 2013). The technology allows knowledge workers such as managers, executives, and analysts to take faster and better decisions (Chaudhuri et al., 2011). The technological factor is divided into infrastructure related factors and data related factors (Yeoh & Koronios, 2010).

Moreover, the technological factor is effected by certain innovation features such a complexity, relative advantage (RA), and compatibility (Lutfi et al., 2016).

Additionally, developing a successful Business Intelligence program involves a strong foundation of usable, high quality, and integrated data. Certainly, one of the main advantages of a BI solution is the combination of large sums of different data into a single data repository. Therefore, ensuring that the department has the suitable software and hardware required for a Business Intelligence program is essential. Business Intelligence success can be attained when the technology of the Business Intelligence program are aligned with the needs of the business (Rosedahl J. L., 2016).

According to Hirsimäki (2017), the most mentioned factors were sustainable data quality, integrity and accuracy; understanding the firms processes and needs requirements; and business driven, flexible and scalable technical framework. Additional factors were related closely to the previously mentioned. Those factors were as effective data management, and suitability of infrastructure and technologies.

2.1.5 The Relationship between Big Data and Business Intelligence:

The differences between Big Data and Business Intelligence have consequences on how they are organized. Usually, Big Data initiatives need predefined questions and are more experimental in nature, Big Data specialists have to be organized so they are close to processes and products in organizations.

However, Business Intelligence teams are establish in internal consulting organizations, IT departments, or centers of excellence, where they provide executives and managers with reports for their stable information needs and well-defined (Debortoli, Müller, & Brocke, 2014).

Furthermore: recognized a number of Similarities and differences between the fields of Big Data and Business Intelligence. Particularly when it comes to general IT methods and concepts and business skills, it observed an extensive overlap between Business Intelligence and Big Data Analytics (cf. Figure 4). For instance, working in either field requires a certain sum of database competency and software engineering. Business development and Sales skills for organization Business Intelligence and Big Data solutions as well overlap. Finally, domain knowledge overlaps in healthcare / digital marketing and life sciences, domains identified to be especially data-driven. The absence of other domain skills is a result of the level of analysis; Business Intelligence and Big Data solutions job ads (e.g., 50 instead of 15 factors) would reveal the additional domains of insurance, banking, finance, and supply chain management.

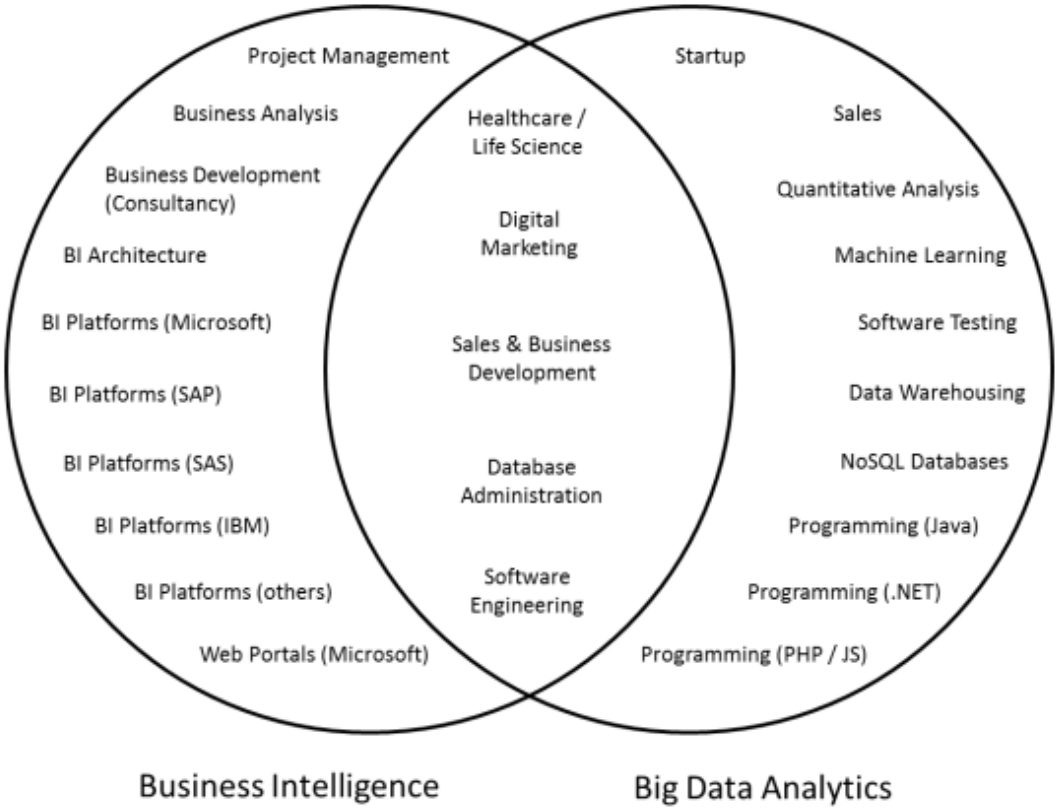

Figure 2.1: Similarities and differences in Business Intelligence and Big Data areas of competency

2.2 Previous Studies

An overview of the previous studies regarding Business Intelligence and Big Data are discussed in this section.

- Adamala & Cidrin (2011) study entitled**: "Key Success Factors in Business Intelligence"** The aim of this paper is to classify the factors that are presented in successful Business Intelligence projects and to organize them into a framework of essential success factors. The findings confirm that Business Intelligence projects are struggling with both technological and non-technological issues, while the non-technological issues are found to be difficult to solve, in addition to more time consuming than their counterparts. Furthermore, the study shows that success factors for Information Systems projects are different from critical success factors for Business Intelligence projects. The study illustrates a summary of success factors across all the dimensions with the highlight of the most important points: Organizational dimension, Process dimension and Technological dimension. The hypotheses of this study focused on the factors that help in the successful Business Intelligence initiatives successful. A quantitative approach was obtained to collect data to reject or support the hypotheses and a primary research survey was used for collecting data.
- Ramakrishnan et al,. (2011) study entitled**: "Factors influencing Business Intelligence (BI) data collection strategies: An empirical investigation'',** The paper observes external pressures that impact the relationship between an organization Business Intelligence (BI) data

collection strategy and the purpose for which BI is implemented. A model is planned and tested that is grounded in organized theory, research about the purpose of BI and research about competitive pressure. Three BI purposes (consistency, insight, and transformation) and two data collection strategies (comprehensive and problem driven) are observed. The research hypothesis is there exists a positive relationship between institutional isomorphism and BI insightfulness and there exists a positive relationship between BI consistency and initiating a comprehensive data collection strategy for BI data collection.

Results provide a theoretical lens to better understand the success factors and the motivators and t related to collecting the huge amounts of data required for BI. The study also provides directors with a mental model on which to base decisions about the data required to achieve their goals for BI.

- Bahrami et al, (2012) study entitled**: "Innovation in Market Management by Utilizing Business Intelligence: Introducing Proposed Framework",** the paper discussed the market management processes, significant necessity of creativity and innovation in these processes for competing in current global trading. Moreover, a Business Intelligence definition from different authors' point of view and Business Intelligence characteristics and principles is discussed. The framework is introduced with consideration to variant dimensions and functions of BI to furnish organization characteristics toward derived benefits from it in business

trend and acquiring Business Intelligence approach. The purpose of this study is introducing practical framework to support organizations in direction of their goals toward Business Intelligence.

- Azmaa & Mostafapourb (2012) study entitles: **"Business Intelligence as a key strategy for development organizations",** the research study discussed the concept of Business Intelligence and the main features of Business Intelligence, the dynamic process which is the organizational Learning, and the complex process which is the processing of smart. The study also investigated the three components of Business Intelligence which are the data sources, data mart and the software generates. In addition, investigating the process implementation and Business Intelligence starting by panning and conducting and ending by the analysis and production information. Finally, justifying the use of Business Intelligence.
- Gandomi & Haider (2014) study entitled**: "Beyond the hype: Big Data concepts, methods, and analytics",** the research discussed the basic concepts relating to Big Data. The study attempts to define the characteristics of Big Data, and discussed the tools and technologies occur to harness the potential of Big Data. A key contribution of this study is to bring the neglected dimensions of Big Data. The popular discourse on Big Data, which is dominated and influenced by the marketing efforts of large hardware and software developers, focuses on structured data and predictive analytics. The paper highlighted the fact that size is only one of

numerous dimensions of Big Data. Other features, such as the frequency with which data are produced, are similarly significant in defining Big Data. The paper then expands the discussion on various types of Big Data, namely text, audio, video, and social media.

- Gu (2014) study entitled**: "The Use of Business Intelligence Techniques in Supply Chain Performance'',** The purpose of this study is to conduct an online survey based on a supply chain performance benchmark to mainly evaluate information technology companies and manufacturing and their user experience of Business Intelligence techniques. This study was mostly focused on examining the impact of the use of Business Intelligence techniques in supply chain performance based on the performance measurement system. The survey had been validated by discussions and interviews with multiple industry experts and practitioners selected by Supply Chain Council's member list. The results of this study represent responses from firms belonging to information technology and manufacturing industries. Moreover, the results showed that a combination use of Business Intelligence techniques and information system from diverse vendor may cause an increase of the overall supply chain performance of the organization.
- Sun, Zou, & Strang (2015) study entitles: **''Big Data Analytics as a Service for Business Intelligence'',** The aim of this study was to inspects how to improve Business Intelligence throughout Big Data analytics as a service by presenting a Big Data analytics services-oriented architecture

(BASOA), and applying BASOA to Business Intelligence. The results show that this proposed BASOA is feasible for facilitating the development of Business Intelligence.

- Mohammed (2015) study entitles: **‘‘ Business Intelligence and Analytics Evolution, Applications, and Emerging Research Areas”**, the goal of the study comprise proposed Business Intelligence & A research framework that can be applied to various high-impact applications such as Improving E-Commerce and Market Intelligence, Improving E-Government, Improving Research in Science and Technology, and Optimizing Business Processes, By mapping important facets of the current BI & A knowledge landscape an area of substantial intrinsic merit. Research is intended to serve, in part, as a platform and conversation guide for examining how the Information Systems (IS) discipline can better serve the needs of business decision makers in light of maturing and emerging BI & A technologies, and the predicted shortages of data-savvy managers and of business professionals with deep analytical skills.
- Rama et al., (2016) study entitled**: “The implications of Big Data analytics on Business Intelligence: A qualitative study in China”,** the study examines the implication and role of Big Data analytics on business intelligence for the data gathered from Social media channels in China. The study data collection and analysis was taking by a qualitative approach. The study has developed a durable semi-structure questionnaire, Based on an extensive literature review. The results have essential impact for each

practice and theory to set up strategies and plans to enhance the advantages of social-media channels for business value. The study investigates implications of Big Data analytics of data collected from Social Media for improved business intelligence in the context of Chinese businesses.

- Rosedahl (2016) study entitles: **"Business Intelligence: Strategies for Improving BI Adoption",** the purpose of this study is to classify the key factors that can assist the organizations to ensure that their BI systems are accepted at both the individual and organization level. By adopting empirical research that identified essential success factors in BI implementations, the study attempts to demonstrate how organizations can integrate these success aspects into a business model that will assist to improve the overall BI adoption rate and to increase the effectiveness of the BI solutions. The model demonstrate how each element plays a significant role in enhancing BI usage and it focuses on the concept of process, people, and technologies. Through using key individuals with a strong background in information technology and business, classifying an essential business requirement, and using iterative development and business-driven approach. The solution presented in this paper uses an iterative approach to establish a solution to the essential business requirement via rapid prototyping. While providing feedback to business leadership, a business solution will be developed through a step-by-step process. Solving a problem through developing a solution to essential business need will assist in showing others the value of business intelligence.

- Havakhor (2016) study entitled**: "Big Data and Organizational Impacts a Study of Big Data Ventures",** the paper investigates the value proposition of a Big Data Ventures service/product as an essential constituent of its business model and seeks to recognize how it impacts the capital raised by Big Data Ventures in their early stages of development. Then, the paper examines the role that the network embededness of Big Data Ventures affects its success. The paper hypothesis that: The positive association between the extent of a Big Data Ventures (volume, velocity, and veracity) emphasis and market returns for the investing firm following the announcement of investing in the Big Data Ventures is moderated by the scope of Big Data Ventures innovation. Finally, the paper discussed the Big Data Ventures strategy in management of its communication with the possible investors on social media platforms.
- DENIC et al., (2016) study entitled: **"Analysis of Key Success Factors for Business Intelligence Systems Implementation",** the research study examines analysis of key success factors for Business Intelligence systems implementation. The investigation is based on the examination of a large amount of literature on related subject, and on the processing of data obtained from interviews with numerous companies. Wide research in the field of information technologies has been carried out to classify critical factors with the aim to improve informatics systems. The research showed that the connection exists and that a certain number of key factors in ERP systems are also relevant in Business Intelligence systems. Many critical

success factors have been identified, that were not identified in any of the previous studies.

- Ojo (2016) study entitled**: "Big Data Analytics Solutions: The Implementation Challenges in The Financial Services Industry",** The purpose of the research study is to collate a comprehensive list of the challenges of implementing Big Data Analytics solutions from existing Big Data Analytics artifacts, and present the challenges to Big Data Analytics subject-matter-experts in the financial services industry. The research findings presented that the challenges of implementing Big Data Analytics solutions in the financial services industry are generally people-driven and strategic, rather than or technology-driven or process-induced. Specifically, misconception and miscommunications of the meanings, intents, and the benefits of Big Data Analytics implementation in the financial services industry were found to be the top challenge.
- Park et al., (2016) study entitled**: "The Role of Business Intelligence and Communication Technologies in Organizational Agility: A Configurational Approach"** The study explores the role that Business Intelligence and communication technologies play in how businesses may achieve organizational decision-making agility, sensing agility, and acting agility in diverse environmental and organizational contexts. Based on dynamic capability theory and the information-processing view of organizations, Survey and questioners with industry managers, business school professors, and business PhD students was conducted to test the face

and content validity of the survey. The research hypothesis that in fast, changeable environments, both communication technologies and Business Intelligence allow organizations (especially large ones) to achieve sensing and acting agility. As well as, the research findings suggest equifinal pathways to organizational agility and the specific boundary conditions of our middle-range theory that determine what role communication technologies and BI play in organizations' achieving organizational agility. The study discussed the implications for theory and practice and discussed future research avenues.

- Vloet (2016) study entitled: **"Influence of Big Data and analytics on management control"** The goal of this study is to obtain more visions into the influences Big Data on management control by means of a qualitative research, and the challenges and benefits that an organization experience by making use of Big Data. The results of this study demonstrate that the expected impact of Big Data on management control is not achieved in the diverse organizations yet.
- Fiaz et al., (2016) study entitled: **"Data Visualization: Enhancing Big Data More Adaptable and Valuable",** the research investigated the Data Visualization techniques and Big Data which together make the usage of data analytics more valuable and efficient. The study discussed the 3 V's (Volume, Variety and Velocity) of Big Data, as follow, volume-the size of data now is larger than terabytes and peta bytes. Velocity-It indicates the time duration for analyzing the data. Variety-Big Data comes from a

variety of sources. Furthermore, the paper discussed the main differences between Big Data use cases and traditional data warehouse.

- Hirsimäki (2017) study entitled: **"Critical Success Factors for Business Intelligence System Implementation",** the research aimed to identify essential success factors for Business Intelligence system implementation and to discover why these factors are essential. The Critical Success Factors were analyzed based on current literature. The most important Critical Success Factors were categorized in organizational, process and technological dimensions. The Critical Success Factors from the organizational dimension were committed management support and sponsorship and well-established business case. From the process dimension the most crucial Critical Success Factors were appropriate team skills, user training and support, and user-oriented change management. And from the technological dimension business driven, flexible framework; sustainable data quality, accuracy and veracity; and understanding the organizations needs, requirements and processes. The interesting observation of this study is that many of the Critical Success Factors have interrelations and are somehow dependent on each other.
- Ashraf (2017) study entitled: **"Organizational Development and Big Data: Factors that impact successful Big Data Implementations",** the study include practical evidence through obtaining a mixed methods study of qualitative and quantitative data. This study explores the following question with this research, "What impacts successful Big Data

Implementations?" As part of this research question some of the following hypotheses were examined: Big Data Characteristics (volume, variety, velocity, veracity, variability, value and computing resources) positively impact successful Big Data Implementations. To successfully accomplish the study approach, a qualitative section utilizing interviews with individuals and organizations in the field followed by a quantitative section to test relationships between core concepts derived from the qualitative section. Finally, the study identifies success criteria for Big Data Implementations and criteria that can affect that success.

2.2.1 Difference between Current Study and Previous Studies

This study will enhance the previous literatures as the following:

1. Big Data: The current study expects to increase the awareness and attention about the impact of Big Data on Business Intelligence.

2. Purpose: Most of the previous studies were conducted to measure either Big Data or Business Intelligence. Few studies were carried out to study both Big Data and Business Intelligence and the impact of Big Data on Business Intelligence in Jordanian telecommunications companies.

3. Environment: All studies have been mostly carrying out in Australia, American, Turkey, India and China. In contrast, the current study was carried in an Arab country, particularly in Jordanian Telecommunications Companies which is considered to be one of the most profitable sectors in Jordan.

4. Industry: There was no previous study investigated Big Data in telecommunication sectors in Jordan, while the current study focused on the Telecommunications Companies in Jordan (Zain, Orange and Umniah).

5. Comparison: The researcher compares the results of the current study with the results of previous studies mentioned earlier to identify similarities and differences.

Chapter Three

Study Methodology (Method and Procedures)

3.1 Introduction

3.2 Study Methodology

3.3 Study Population

3.4 Study Sample

3.5 Study Data Collection Tools

3.6 Study Validity and Reliability

3.7 Study Variables

3.8 Normal Distribution of Study Variables

3.9 Statistical Treatment

Chapter Three

Study Methodology (Method and Procedures)

3.1 Introduction

This chapter illustrated several methods and procedures which have been used to accomplish the objectives of the thesis. Firstly, it consists of a description of the study methodology, the study sample as well as the population, the study tool and methods used to verify the validity and reliability, the study variables and the statistical treatments used in analyzing the study data in order to answer the study hypotheses, In the final section, the researcher discussed the statistical treatment that has been used in the analysis of the collected data.

3.2 Study Methodology

The study used a descriptive analytical method, since it matches the identifications, the hypotheses and the objectives which aimed to investigate "**The impact of Big Data on Business Intelligence**". Furthermore, the descriptive method used to describe the characteristics of the population and the sample allocated.

Collecting data for the purpose of this thesis depend on the questionnaire developed by the researcher base upon several previous studies and scientific reviews. Then the questionnaires were distributed to Top level, Mid level & Low level employees of the three existed telecommunication companies in Jordan (Zain, Orange and Umniah).

Consequently, a statistical treatment was conducted to the study data collection to find their effects of independent variable on the dependent variable in relation with the suggested hypotheses and the study aims. Eventually, Data were collected, and then the recommendations and conclusions are suggested.

3.3 Study Population

The study population depend on the Top level, Mid level and Low level employees consisted of the three existed telecommunications companies in the Jordanian market (Zain, Orange, and Umniah), relying on who was available at the time of distributing the questionnaires.

3.4 Study Sample

The sample of this study sample consists of (312) out of (1650)'s employees were pulled chosen through simple random, who are working at Jordanian telecommunication companies. The sample size was considered appropriately as it represents the total community according to (Sekaran & Bougie, 2013).

The sample was calculated through the following equation:

- Sample Size = Z 2 * (p) * (1-p) /c 2
- Z = Z value (95% confidence level)
- p = percentage picking a choice, (.5 used for sample size needed)
- c = confidence interval, (5)

After distributing (312) questionnaires constantly through employees working in three Jordanian Telecommunications Companies (Zain, Orange, and Umniah), as shown in Table (3-1). A total of (270) from (312) answered questionnaires were retrieved, of which (35) were discarded due to large missing data. Therefore, (235) answered questionnaires from study unit of analysis were valid for study.

Table (3-1): Distributed questionnaires among employees in Jordanian telecom companies

No.	Company's names	No. of Questionnaires Distributed	No. of Questionnaires Retrieved	No. of Questionnaires Good for analysis
1	Zain	103	89	75
2	Orange	105	95	82
3	Umniah	104	86	78
	Total	312	270	235

3.5 Study Data Collection Tools

The data that was obtained to achieve the objectives of this study was divided into two groups as the following:

- **Secondary Data:** From books, journals, dissertations, researches, articles, working papers, and the worldwide web, used to write the theoretical framework of the study.
- **Primary Data:** A questionnaire has been prepared by the researcher to answer the study statements and hypothesis; for the purpose of understating the impact of Big Data on Business Intelligence.

Basically, both secondary and primary data were used in this study. Furthermore, the data collected by using questionnaire was constructed through the following three sections:

- First section: demographic information that was collected with close-ended questions, through five factors which included: Gender, Age, Educational Qualification, Job Level and Years of Experience.

- Second section: this section measured the Big Data Characteristics over three Characteristics: (Volume, Velocity, and Variety); (24) items adopted from (Ashraf, 2017) & (Björkman, 2017) & (Loshin, 2013). However, Big Data Characteristics measured by the five-point Likert-type ranging from 1 (Strongly disagree) to 5 (Strongly agree) as revealed in table (3-2).

- Third section: this section measured the Business Intelligence over three dimensions (Organizational, Process, and Technology); (17) items (Huie, 2014) & (Pope, 2014). However, Business Intelligence measured by the five-point Likert-type ranging from 1 (Strongly disagree) to 5 (Strongly agree) as revealed in table (3-2).

Table (3-2): Likert-type Scale

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

3.6 Study Validity and Reliability

To validate the data collection instrument used in this study in terms of its readability, format, and ability to measure the study's constructs; the study distributed the questionnaire instrument to (9) professors in public and private universities in Jordan as shown in (Appendix 2), those who have specializations in business management, E-Business, and scientific research. The questionnaire instrument was updated and developed to reflect the suggestions comments that received from the experts. Moreover, experts paid attention and interact with the study and the questionnaire instrument which raised its validity. In order to measure the reliability of this study's constructs. Table (3-3) and table (3-4) showed that for each variable.

Table (3-3) is showing the result of reliability (Cronbach' Alpha) for Big Data variables, value range between (0.75-0.81).

Table (3-3): Reliability Test (Cronbach' Alpha) for the Big Data Variables.

No.	Variables	Number of Questions	Cronbach's Alpha
1	Volume	8	0.78
2	Velocity	8	0.81
3	Variety	8	0.75

Further, table (3-4) shows the result of reliability (Cronbach' Alpha) for Business Intelligence variables, value range between (0.71-0.80).

Table (3-4): Reliability Test (Cronbach' Alpha) for Business Intelligence Variables.

No.	Variables	Number of Questions	Cronbach's Alpha
1	Organizational	6	0.71
2	Process	5	0.74
3	Technology	6	0.80

3.7 Study Variables

The study categorized and measured the **independent variable** (Big Data) referring to the scientific articles (Havakhor, 2016) & (Ashraf, 2017). Also, categorized and measured the **dependent variable** (Business Intelligence) referring to the scientific articles (Rosedahl J. L., 2016) & (Adamala & Cidrin, 2011).

All variables were measured by the five-point Likert-type ranging from 1 (Strongly disagree) to 5 (Strongly agree) that used throughout the questionnaire as shown in table (3-2).

3.8 Normal Distribution of Study Variables

To validate the absence study data from the statistical problems that could impact the study hypothesis, a normal distribution of variables used (Kolmogorov– Smirnov Z) test was obtained, Table (3-5) show the normality distribution for variable data.

Table (3-5): Normal Distribution of Study Variables

No	Variables	Kolmogorov–Smirnov	Sig*	Result
1	Organizational	0.265	0.069	Normal distribution
2	Process	0.257	0.181	Normal distribution
3	Technology	0.292	0.072	Normal distribution

***Distribution is normal when the significance level ($\alpha \leq 0.05$).**

Based on reviewing the table above and at the significance level of ($\alpha \leq 0.05$) it is apparent that the distribution of all variables was normal, where the normal distribution ratios for each variable is greater than (0.05) which is an approved level in the statistical treatment of the current study.

3.9 Study Treatment

The collected data conducted from the responses of the thesis questionnaire were utilized by statistical package for social sciences (SPSS") for conclusion and data analysis. Therefore, the following suitable statistical methods were utilized:

- Percentage and Frequencies used to explain the characteristics of research respondents.
- Cronbach's Alpha reliability to measure strength of the coherence between questionnaire Questions.
- Arithmetic Mean to identify the level of response of study sample individuals to the study variables.
- Standard Deviation to measure the responses spacing degree about Arithmetic Mean.
- Multiple Regression analysis to measure the impact of independent variables on dependent variable
- Simple Regression analysis to measure the impact of study each independent variables effect on dependent variable.

Chapter Four

Data Analysis and Hypothesis Testing

4.1 Introduction

4.2 Data Analysis

4.2.1 Description of characteristics of study sample

4.2.2 Description of study variables

4.3 Hypothesis Testing

Chapter Four

Data Analysis and Hypothesis Testing

4.1 Introduction

The outcomes of statistical analysis that are discussed in the study methodology of chapter three are determines in this chapter. Furthermore, the results of the study aim to explore the effect of Big Data on Business Intelligence in Jordanian telecommunication companies (Zain, Umniah and Orange) and hypothesis testing.

4.2 Data Analysis

To test the study hypotheses and to answer the research questions, the study used the Statistical Package for Social Sciences (SPSS). Similarly, to answer the research questions, the study used frequencies, means, standard deviations, and Cronbach's Alpha test to examine the consistency and reliability of the data collection tool.

4.2.1 Description of Characteristics of Study Sample

Demographic information of the study sample discus in this section such as: gender, age, educational, job level and number of years experience. Table 4-1 shows a descriptive analysis of the study sample based on different personal and functional variables.

Table 4-1 Descriptive analysis sample

Variable	Categories	Frequency	Percent
Gender	Male	138	58.7
	Female	97	41.3
	Total	**235**	**100.0**
Age	Less than 28 years old.	57	24.3
	28-38 years old.	99	42.1
	39-48 years old.	54	23.0
	49-58 years old.	18	7.7
	More than 58 years old.	7	3.0
	Total	**235**	**100.0**
Educational	High Diploma.	18	7.7
	Bachelor's Degree.	145	61.7
	Master's Degree.	57	24.3
	PhD Degree.	12	5.1
	Other.	3	1.3
	Total	**235**	**100.0**
Job Level	Low level.	146	62.1
	Mid level.	73	31.1
	Top level.	16	6.8
	Total	**235**	**100.0**
Experience	Less than 5 years.	25	10.6
	5-14 years.	71	30.2
	15-20 years.	112	47.7
	More than 20 years.	27	11.5
	Total	**235**	**100.0**

As shown in Table 4-1 the sum of **gender** was 235 divided Male by frequency (138) with percentage 58.7%, however Female by frequency (97) percentage 41.3%.

While **Age:** the highest category was (28-38 years old) by frequency (99) percentage 42.1%, then category (Less than 28 years old) by frequency (57) percentage 24.3%, then

category (39-48 years old) by frequency (54) percentage 23.0%, then category (49-58 years old) by frequency (18) percentage 7.7% but the lowest category (More than 58 years old) by frequency (7) percentage 3 %. So table 4-1 above guides to understand that the most of the study sample are young, and they can absolutely evaluate the Big Data impact in their Business Intelligence.

Moreover, **Educational Qualification** show that Bachelor's Degree by frequency 145 and percentage 61.7% the highest category, then Master's Degree by frequency (57), percentage 24.3% , then High Diploma by frequency 18 percentage 7.7% , then (PhD Degree) by frequency (12), percentage 5.1%, but the lowest category (Other) by frequency (3), with percentage 1.3%. Consequently, that good education can evaluate the impact of Big Data on Business Intelligence.

As well as in **Job Level :** the highest category Low level by frequency (146) percentage 62.1%, then Mid level by frequency (73) percentage 31.1%, but the lowest category Top level by frequency (16) percentage 6.8%. This indicates that the staff can more help in the impact of Big Data on Business Intelligence.

Finally **Years of Experience**: the highest category (15-20 years) by frequency (112) percentage 47.7%, then (5-14 years) by frequency (71) percentage 30.2%, then (More than 20 years) by frequency (27) percentage 11.5% but the lowest category (Less than 5 years) by frequency (25) percentage 10.6%.

4.2.2 Description of Study Variables

Based on the data collected from the answers of the employees on the study's samples, the researcher has calculated the standard deviations and the mean for the study constructs along with the Questions as the following:

a) Independent variable (Big Data):

- **Volume*:*** Table 4-2 shows the statistical values for Volume, which indicate that the highest mean for question 4: "**Big Data volume is used to reduce the incidence of crises**" achieved (4.17) by high Importance level, then question (8)" **Big Data Volume is used to provide objectivity for decisions making"** the mean was (3.96) by high Importance level. While, the lowest mean was (3.61) for question: 7 "**The use of large data increases work efficiency**" by high Importance level. **The total mean for the Importance of "Volume" was (3.821) by high Importance level, which indicate that Volume have high Importance from perspective of sample study**.

Table 4-2: Mean and Standard Deviation for "Volume" Questions

No	Questions	Mean	S.D	Rank	Importance
1	The use of Big Data volume facilitates obtaining reports to the Business Intelligence.	3.88	0.932	3	High
2	The use of large data helps to predict the future decisions.	3.71	0.958	6	High
3	Big Data Volume improves data quality.	3.74	0.834	5	High
4	Big Data volume is used to reduce the incidence of crises.	4.17	0.899	1	High
5	The use of large data helps to extract knowledge for the decision maker.	3.69	0.898	7	High

6	The use of large data helps in obtaining correct information.	3.83	0.987	4	High
7	The use of large data increases work efficiency.	3.61	1.151	8	Medium
8	Big Data Volume is used to provide objectivity for decisions making.	3.96	0.669	2	High
Total		**3.821**	**0.579**	-	**High**

- **Velocity:** Table (4-3) shows that the highest mean was (3.90) for question 4: "**The company has sufficient control over Big Data velocity**" by high Importance level, then for question 2&3 "**Big Data Velocity is used to provide speed in accomplishing tasks**", "**Big Data Velocity improves Business Intelligence process**" with the same mean was (3.86) by high Importance level, and the lowest mean was (3.54) for question 8 "**Big Data Velocity increases work effectiveness**" by medium Importance level. **The total mean for "Velocity" was (3.76) by high Importance level, which means Velocity has high Importance from perspective of sample study.**

Table (4-3): Mean and standard deviation for "Velocity" Questions

No	Questions	Mean	S.D	Rank	Importance
1	Big Data Velocity is used to provide objectivity in accomplishing tasks.	3.77	0.794	3	High
2	Big Data Velocity is used to provide speed in accomplishing tasks.	3.86	0.998	2	High
3	Big Data Velocity improves Business Intelligence process.	3.86	0.945	2	High
4	The company has sufficient control over Big Data velocity.	3.90	0.803	1	High

5	Data can be analyzed on real-time for users.	3.72	0.905	4	High
6	Velocity of Big Data is an opportunity to the organization.	3.69	0.915	5	High
7	Big Data Velocity increases work efficiency.	3.72	0.951	4	High
8	Big Data Velocity increases work effectiveness.	3.54	0.911	6	Medium
Total		**3.76**	**0.594**	**-**	**High**

- **Variety:** Table 4-4 shows that the highest means was (3.93) for question 2 "**Big Data Variety improves the Business Intelligence process**." by high Importance level, then for question 4: "**Big Data Variety increases work efficiency**. " the mean is (3.88) by high Importance level, and the lowest means was (3.69) for question 6: "**Using Big Data Variety helps extract important information.**" by high Importance level. **The total mean for "Variety" was (3.797) by high Importance level.**

Table (4-4): Mean and Standard Deviation for "Variety" Questions

No	Questions	Mean	S.D	Rank	Importance
1	Big Data Variety is used to provide objectivity for decisions making.	3.83	0.890	3	High
2	Big Data Variety improves the Business Intelligence process.	3.93	0.731	1	High
3	Big Data Variety increases work effectiveness.	3.72	0.942	6	High
4	Big Data Variety increases work efficiency.	3.88	0.914	2	High
5	Big Data Variety is used to reduce the incidence of crises.	3.80	1.071	5	High

6	Using Big Data Variety helps extract important information.	3.69	0.947	8	High
7	Big Data Variety is used to guide policies to help rationalize decisions.	3.71	1.021	7	High
8	Big Data Variety is used to make rational decisions.	3.82	0.855	4	High
Total		**3.797**	**0.560**	**-**	**High**

b) Dependent variable (Business Intelligence):

- **Organizational*:*** Table 4-5 shows that the highest mean was (3.85) for question 5: "**The Company has supported the use of Business Intelligence technology**." by high Importance level, then for question 4: " **Business Intelligence derived to quality of information**." the mean was (3.79) by high Importance level, and the lowest mean was (3.66) for question 3: " **The information derived from Business Intelligence is easily accessible**." by medium Importance level. **The total mean for "Organizational" reached (3.763) by high Importance level.**

Table (4-5): Mean and standard deviation for "Organizational" Questions

No	Questions	Mean	S.D	Rank	Importance
1	The information obtained from Business Intelligence is accurate.	3.71	0.930	4	High
2	The information derived from Business Intelligence is useful.	3.70	0.876	5	High
3	The information derived from Business Intelligence is easily accessible.	3.66	0.884	6	Medium

4	Business Intelligence derived to quality of information.	3.79	0.841	2	High
5	The Company has supported the use of Business Intelligence technology.	3.85	0.896	1	High
6	The company has skillful for using Business Intelligence techniques.	3.74	0.881	3	High
Total		**3.763**	**0.469**	**-**	**High**

- **Process:** Table (4-6) shows that the highest means reached (3.97) for question 1: "**There is the right skill to be able to process Business Intelligence results."** by high Importance level, then for question 5: "**The company has the internal capabilities to deal with the Business Intelligence methods."** the mean was (3.64) by medium Importance level, and the lowest mean was (3.40) for question 3: "**Our data storage meets the demands of Business Intelligence processing**." by medium Importance level. **The total mean for "Process" achieved (3.699) by high Importance level.**

Table (4-6): Means and standard deviation for "Process" Questions

No	Questions	Mean	S.D	Rank	Importance
1	There is the right skill to be able to process Business Intelligence results.	3.97	0.867	1	High
2	There are many changes in process due to the adoption of Business Intelligence.	3.60	0.912	3	Medium
3	Our data storage meets the demands of Business Intelligence processing.	3.40	0.879	5	Medium

4	The company has the right skills to deal with Business Intelligence methods.	3.48	0.935	4	Medium
5	The company has the internal capabilities to deal with the Business Intelligence methods.	3.64	0.842	2	Medium
Total		**3.699**	**0.3893**	-	**High**

- **Technology:** Table 4-7 shows that the highest mean was (3.78) for question 6: "**Using Business Intelligence technology increases productivity**." by high Importance, then for question 4: " **Using Business Intelligence technology is useful for company**." the mean was (3.60) by medium Importance level, and the lowest mean was (3.32) for question 5: " **Using Business Intelligence technology enables to accomplish tasks more quickly.**" by medium Importance level. **The total mean for "Technology" reached (3.566) by Medium Importance level.**

Table (4-7): Mean and standard deviation for "Technology" Questions

No	Questions	Mean	Standard Deviation	Rank	Importance
1	Using Business Intelligence technology allows me to retrieve more information.	3.54	0.887	3	Medium
2	Using Business Intelligence technology improves the quality of decision.	3.33	1.143	5	Medium
3	IT infrastructure supports our Business Intelligence strategy.	3.53	1.026	4	Medium
4	Using Business Intelligence technology is useful for company.	3.60	1.095	2	Medium
5	Using Business Intelligence technology enables to accomplish tasks more quickly.	3.32	0.990	6	Medium

6	Using Business Intelligence technology increases productivity.	3.78	0.864	1	High
Total		**3.566**	**0.395**	-	Medium

4.3 Hypothesis Testing

Before applying regression analysis to test the hypotheses of the study, the researcher conducted some tests to ensure that the data fit the regression analysis assumptions as follows:

Multicollinearity was Detected by using the Tolerance and Variance Inflation Factory (VIF) test for each of the study independent variables, taking into account that Tolerance value must be more than 0.2 and the VIF value must be less than 10. Table (4-8) shows the results of tests mentioned above.

Table (4-8): Multi-collinearity, VIF, Tolerance test and Skewness coefficient.

Independent Variables	Tolerance	VIF	Skewness
volume	.921	1.085	-1.114
velocity	.826	1.211	-0.815
variety	.868	1.152	-1.162

For testing the study hypotheses; the researcher has used "multiple regressions analysis" to analyze the impact of the knowledge leakage on innovative performance. In order to be able to use multiple regressions the following assumptions should be performed:

normality, validity, reliability, and correlation. "F" is showing the fitness of the model, while, "R²" is indicating the variance value between independent and dependent variables for the model (Sekaran & Bougie 2013).

The Main Hypothesis:

($H_0$1): There is no impact of Big Data (Volume, Velocity, and Variety) on Business Intelligence (Organizational, Process, and Technology) in Jordanian Telecommunications Companies, at the level of significance ($\alpha \leq 0.05$).

Multiple Regression Analysis, was used as shown in table 4-8, to test and detect (**$H_0$1** hypothesis), the impact of Big Data (Volume, Velocity, and Variety) on Business Intelligence (Organizational, Process, and Technology) in Jordanian Telecommunications Companies.

Table (4-9): Multiple Regression Analysis

Independent Variable	Model Summary			ANOVA		Coefficients		Standardized Coefficients
	R	R^2	Adjusted R^2	"F" Value	"F" Sig	"T"	"T" Sig	Beta
	0.803	0.645	0.548	6.667	0.00			
Volume						0.947	0.364	0.210
Velocity						3.922	0.002	0.773
Variety						1.474	0.169	0.317

***Dependent variable:** Business Intelligence

Table 4-9 shows statistically Multiple Regression Analysis, where R value was (0.803); indicates that there is a positive correlation between Big Data and Business Intelligence, R^2 value was (0.645); which means that the value of 64% of changes in Business Intelligence, from changes in the Big Data processes at all variable. Additionally, the table demonstrates that the value of adjusted R^2 is nearby to the value of R^2. If the adjusted R^2 is omitted from R^2 (0.645-0.548) = 0.097. This slight reduction (0.097) means that if the model has been fitted when the entire population contributes in the study, the higher change in the outcome will be 0.097.

In another hand, the table above shown the probability of F value was (6.667) by significant (0.00), and indicates that Big Data (Volume, Velocity, and Variety) has a significant impact on Business Intelligence (Organizational, Process, and Technology) in Jordanian telecommunication companies. Which mean the main hypothesis (**H_o1**) was rejected and accepts the alternative hypothesis to be as follows:

- ✓ **There is significant impact of Big Data (Volume, Velocity, and Variety) on Business Intelligence (Organizational, Process, and Technology) in Jordanian Telecommunications Companies at ($\alpha \leq 0.05$).**

The Sub Hypothesis:

($H_0$1.1): There is no impact of Big Data Volume on Business Intelligence (Organizational, Process, and Technology) in Jordanian Telecommunications Companies at the level of significance ($\alpha \leq 0.05$).

Simple linear regression analysis was used to test and detect this hypothesis which is the impact of Big Data (Volume) on Business Intelligence (Organizational, Process, and Technology) in Jordanian Telecommunications Companies, as shown in table (4-10).

Table (4-10): Simple Linear Regression Analysis for Volume

Independent Variable	Model Summary			ANOVA		Coefficients		Standardized Coefficients
	R	R^2	Adjusted R^2	"F" Value	"F" Sig	"T"	"T" Sig	Beta
	0.874	0.764	0.735	25.947	0.00			
Volume						5.094	0.00	0.874

***Depended variable:** Business Intelligence

Table (4-10): described that at significant level ($\alpha \leq 0.05$) of the impact of Big Data (Volume) on Business Intelligence (Organizational, Process, and Technology) in Jordanian telecommunication companies, where R value reached (0.874); mean that there is a positive correlation between Volume and Business Intelligence (Organizational, Process, and Technology), R^2 value was (0.764); which means that the value of 76% of changes in

Business Intelligence (Organizational, Process, and Technology), from changes in the Volume.

Additionally, the table demonstrates that the value of adjusted R^2 is nearby to the value of R^2. If the adjusted R^2 is omitted from R^2 (0.764-0.735) = 0.029. This slight reduction (0.029) means that if the model has been fitted when the entire population contributes in the study, the higher change in the outcome will be 0.029.

It can be seen from table 4-9 , the probability of F value reached (25.947) by significant (0.00), and which indicates that Big Data (Volume) has a significant impact on Business Intelligence (Organizational, Process, and Technology) in Jordanian telecommunication companies. So the **(H_o1.1)** was rejecting and accepts the alternative hypothesis to be as follows:

- ✓ **There is impact of Big Data Volume on Business Intelligence (Organizational, Process, and Technology) at the level of significance ($\alpha \leq 0.05$).**

(H_o1.2): **There is no impact of Big Data Velocity on Business Intelligence (Organizational, Process, and Technology) in Jordanian Telecommunications Companies at the level of significance ($\alpha \leq 0.05$).**

Simple linear regression analysis was used, as shown in table 4-10, to test **(H_o1.2)** hypothesis, and to spot the impact of Big Data Velocity on Business Intelligence (Organizational, Process, and Technology), in Jordanian telecommunication companies.

Table (4-11): Simple Linear Regression Analysis for Velocity

Independent Variable	Model Summary			ANOVA		Coefficients		Standardized Coefficients
	R	R^2	Adjusted R^2	"F" Value	"F" Sig	"T"	"T" Sig	Beta
	0.669	0.448	0.428	22.719	0.00			
Velocity						4.766	0.00	0.669

*** Dependent variable:** Business Intelligence

Table (4-11): described that at significant level ($\alpha \leq 0.05$) of the impact of Big Data (Velocity) on Business Intelligence (Organizational, Process, and Technology) in Jordanian telecommunication companies, where R value reached (0.669); mean that there is a positive correlation between Velocity and Business Intelligence (Organizational, Process, and Technology), R^2 value was (0.448); which means that the value of 44% of changes in Business Intelligence (Organizational, Process, and Technology), from changes in the Velocity.

Moreover, the table determines that the value of adjusted R^2 is adjacent to the value of R^2. If the adjusted R^2 is omitted from R^2 (0.448-0.428) = 0.02. This slight reduction (0.02) means that if the model has been fitted when the entire population contributes in the study, the higher variance in the outcome will be 0.02.

It can be seen from table 4-11 , the probability of F value reached (22.719) by significant (0.00), and which indicates that Big Data (Velocity) has a significant impact on Business Intelligence (Organizational, Process, and Technology) in Jordanian telecommunication

companies. So the **($H_0$1.2)** was rejecting and accepts the alternative hypothesis to be as follows:

- ✓ **There is impact of Big Data Velocity on Business Intelligence (Organizational, Process, and Technology) at the level of significance ($\alpha \leq 0.05$).**

($H_0$1.3): **There is no impact of Big Data Variety on Business Intelligence (Organizational, Process, and Technology) in Jordanian Telecommunications Companies at the level of significance ($\alpha \leq 0.05$).**

Simple linear regression analysis was used, as shown in table 4-12, to test **($H_0$1.3)** hypothesis, and to spot the impact of Big Data Variety on Business Intelligence (Organizational, Process, and Technology), in Jordanian telecommunication companies.

Table (4-12): Simple Linear Regression Analysis for Variety

Independent Variable	Model Summary			ANOVA		Coefficients		Standardized Coefficients
	R	R^2	Adjusted R^2	"F" Value	"F" Sig	"T"	"T" Sig	Beta
	0.703	0.495	0.477	27.414	0.00			
Variety						5.236	0.00	0.703

*** Dependent variable:** Business Intelligence

Table (4-12): described that at significant level ($\alpha \leq 0.05$) of the impact of Big Data (Variety) on Business Intelligence (Organizational, Process, and Technology) in Jordanian

telecommunication companies, where R value reached (0.703); mean that there is a positive correlation between Variety and Business Intelligence (Organizational, Process, and Technology), R2 value was (0.495); which means that the value of 50% of changes in Business Intelligence (Organizational, Process, and Technology), from changes in the Variety.

Also, the table demonstrates that the value of adjusted R^2 is nearby to the value of R^2. If the adjusted R^2 is excerpted from R^2 (0.495-0.477) = 0.018. This slight reduction (0.018) means that if the model has been fitted when the whole population contributes in the study, the higher variance in the outcome will be 0.018.

It can be seen from table 4:12, the probability of F value reached (27.414) by significant (0.00), and which indicates that Big Data (Variety) has a significant impact on Business Intelligence (Organizational, Process, and Technology), in Jordanian telecommunication companies. So the (H_o1.3) was rejecting and accepts the alternative hypothesis to be as follows:

- ✓ **There is impact of Big Data Variety on Business Intelligence (Organizational, Process, and Technology) at the level of significance ($\alpha \leq 0.05$).**

Chapter Five

Results Discussion, Conclusion and Recommendations

5.1 Introduction

5.2 Study Results

5.3 Study Conclusion

5.4 Study Recommendations

Chapter Five

Results, Conclusion and Recommendations

5.1 Introduction

The main purpose of this study is to examine the effect of Big Data on Business Intelligence in the Jordanian telecommunications companies. To accomplish the purposes of this study, the study has established a model to measure the effect of Big Data on Business Intelligence. A wide literature review has been conducted to build the study model. The model has two types of variables: the dependent variables which contain (Organizational, Process and Technology) and the independent variables which contain (Volume, Velocity, and Variety). The said model was verified in Jordanian telecommunications companies. However, the study examined the importance of Big Data, Business Intelligence, and the combination between them. Furthermore, the study verified how much Big Data impact Business Intelligence at the concerned companies.

5.2 Study Results

The results are compared and discussed with other studies in relation with the data analysis and responses that described in previous chapter as following:

5.2.1 Independent variable (Big Data):

- **Volume:**

According to the results of exploring the effect of Big Data (Volume) on Business Intelligence, it shows that there is a high level of agreement on "**Volume**", in accordance to the study sample viewpoint. However, the result is close to (Ashraf, 2017) & (Björkman, 2017). In addition, there is slight literature review on classifying the problems of generating value over Big Data for business intelligence purposes. As shown below, the study contains a high degree of developing Volume for Business Intelligence.

- For the statement **"Big Data volume is used to reduce the incidence of crises"** the Mean of Volume dimension displayed a high degree (4.17) for lessen the incidence of crises by consuming Big Data Volume, which showed that Big Data Volume enhance companies in their accurate efforts to be more informed as the Volume of Big Data are able to significantly improve the situational awareness.
- The statement **"Big Data Volume is used to provide objectivity for decisions making"** showed that there is a high degree (3.96) of decisions making via consuming Big Data Volume, which indicated that Big Data Volume improve the companies decisions making.
- On the other hand, the statement **"The use of large data increases work efficiency"** indicated low rank with degree (3.61) for consuming the large data to reduce work efficiency. Therefore, if this high increase in volume does not plan properly it can generate a lot of difficulties for the companies.

- **Velocity:**

There is a high level of agreement on **"Velocity"**, from the viewpoint among the model of this thesis. Also, the outcomes were well-matched with (Ashraf, 2017) & (Björkman, 2017) . Subsequently, the investigator discussed the impact of Big Data (Velocity) on Business Intelligence; the observations are listed as the following:

- High significance for the statement **"The Company has sufficient control over Big Data velocity"** with a degree of (3.90), which indicated that the companies have good skills to control over the velocity of Big Data.
- On the other side, statistics indicated high rank for the statement **"Big Data Velocity is used to deliver speed in accomplishing tasks"** by Mean degree (3.86) showed that the velocity of Big Data providing speed in accomplishing tasks for the staff in the companies.
- However, the statement **"Big Data Velocity increases work effectiveness"** showed low rank with degree (3.54) indicated that the companies should give more efforts for increasing the awareness for the significance of the Big Data velocity for increasing the effectiveness in their work.

- **Variety:**

From the viewpoint of the thesis sample, high level of agreement on "**Variety**" is shown. Subsequently, the outcomes were consistent with (Björkman, 2017) & (Loshin, 2013). However, the investigator discussed the findings of the impact of Big Data (Variety) on Business Intelligence as shown below:

- The Mean of **"Big Data Variety improves the Business Intelligence process"** showed a high degree (3.93), which presented that the process of Business Intelligence enhanced via the Variety of Big Data.
- High importance for the statement of **"Big Data Variety increases work efficiency"** with a degree of (3.88), which showed that the work efficiency in the companies increases via consuming the Variety of Big Data, consequently the Big Data applications is for Business Intelligence to improving the efficiency of the employers.
- Furthermore, the low rank of the statement **"Using Big Data Variety helps extract important information"** indicates that to know how to extract vital information from the Variety of Big Data, the companies shall require more professional's skills for using technology.

5.2.2 Dependent variable (Business Intelligence):

- **Organizational:**

From the viewpoint of the thesis sample, high degrees of agreement on "**Organizational**" are verified. Also, the findings were consistent with (Huie, 2014) & (Pope, 2014) study results. The findings of exploring the Business Intelligence (Organizational) argued as following:

- High degree by (3.85) for the Mean of the statement **"The company has supported the use of Business Intelligence technology",** this showed that the companies are supporting the using of Business Intelligence technology.
- On the other side, statistics indicated lower Mean degree (3.66) for **"The information derived from Business Intelligence is easily accessible"** indicates that reaching

Business Intelligence input were not easy, hence to enhance the companies process for making their decision, they shall permitted their staff to access Business Intelligence technology.

- **Process*:***

From the viewpoint of the thesis sample, a high degree of agreement on **"Process"** is confirmed, in addition, this result consistent with (Huie, 2014) study outcomes. The results explore the positive effect of Big Data on Business Intelligence (Process) as discussed below.

- The Mean of the statement **"There is the right skill to be able to process Business Intelligence results"** presented a high degree with (3.97) which indicated that the companies have high skills to deals with Business Intelligence results.
- On the other side, statistics displayed lower Mean degree (3.40) for **"Our data storage meets the demands of Business Intelligence processing"** which indicate that to be able to meet demands for the process of Business Intelligence; the companies should improve the storage of their data.

- **Technology:**

From the viewpoint of the thesis sample, high degrees of agreement on **"Technology"** are verified. Moreover, this result is consistent with (Huie, 2014) study result. However, the results of examine the Business Intelligence (Technology) are discussed as the following:

- The Mean of the statement **"Using Business Intelligence technology increases productivity"** presented a high degree with (3.78) which indicated that the productivity of the companies increases by using Business Intelligence technology.
- High importance for the statement of **"Using Business Intelligence technology is useful for company"** with a degree of (3.60), indicated that the processes and work technologies to obtain Business Intelligence since that it is high-value for the companies.

5.3 Study Conclusions

The Big Data can suggest value to organizations in numerous ways, presents a multitude of opportunities to enhance business value and productivity. Some of the adaptation of Big Data on Business Intelligence is to enhance decision making capabilities, classifying customer requirements, exploring new markets, facing competitive environment, decreasing customer complaints and improving staff productivity and efficiency. To that objective, this study discovers the influence of Big Data for improved Business Intelligence inside the context of Jordanian telecommunication companies.

Based on the outcomes of this thesis study, following points are concluded:

- There are a real agreement within the Telecommunication companies concerning the significance of Business Intelligence and Big Data.
- Staffs at Telecommunication companies in Jordan believe on the importance of Big Data Characteristics (Volume, Velocity, and Variety) to improve Business Intelligence factors (Organizational, Process, and Technology).

- Telecommunication companies would achieve excellent benefits of the Big Data characteristics. If they take consideration to the Big Data Volume of, Big Data Velocity and Big Data Variety.
- The results show that Big Data has an impact on Business Intelligence; this means that by adopting new practices of Big Data, the companies have to increase its Big Data practices within companies in order to succeed.

5.4 Study Recommendations

The researcher proposes the following recommendations to meet the study purposes in relation to the study results and research conclusions:

1. Companies should support all staffs at all level to apply the Big Data process in their daily work to be adapted to Big Data.
2. Big data influences the employees work effectiveness and efficiency, therefore, it is recommended that all staffs shall conduct research regarding the impact of Big Data on Business Intelligence.
3. Companies should use the Big Data characteristics to provide the speed and objectivity in accomplishing task.
4. In order to survive in the digitalized and dynamic markets, the study recommended that the telecommunication companies to start adapt using Big Data analytics.
5. In order to discover the hidden knowledge from the massive data in the companies, it is recommended that the telecommunication companies to support their Big Data analytics tools.

6. To achieve the business targets and improve their decision making, the study recommends the telecommunication companies to be more support for their Big Data analytics tools.
7. For the betterment of the company's success, the study recommends that top management in telecommunication companies to improve their Big Data.

The researcher suggested some future studies as follows:

1. The study recommends other researchers to explore other impacts of applying Big Data on Business Intelligence.

2. Encourage others to conduct more researches and studies in field of Business Intelligence in the future.

3. Expanding the study of the impact of Big Data on Business Intelligence by adding demographic characteristics as an intermediate variable.

4. Exploring the others characteristics of Big Data and their impact on Business Intelligence.

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Appendixes

Appendix (1): Study Questionnaire

جـــامـعـــة الـــشـرق الأوسـط
MIDDLE EAST UNIVERSITY

Scientific Research Questionnaire

Dear Participant,

The researcher is currently conducting a scientific study intended to identify the: "**The Impact of Big Data on Business Intelligence: A Field Study on Jordanian Telecommunication Companies".**

The purpose of this study is obtain master's degree in e-Business, your assistance to answer the study questionnaire means a lot to us, and will add value to our study. It will be used only for academic purpose and will not be used outside the scope of this scientific research.

I should appreciate very much your kind assistance to answer the attached questions.

Thank you very much in anticipation.

Supervisor **Researcher**

Prof. Hebah H. O. Nasereddin **Wesam Ibrahim Nafi**

First Section: Demographic Variables

Gender

□ Male. □ Female.

Age

□ Less than 28 years old. □ 28-38 years old.

□ 39-48 years old. □ 49-58 years old.

□ More than 58 years old.

Educational Qualification

□ High Diploma. □ Bachelor's Degree.

□ Master's Degree. □ PhD Degree.

□ Other……

Job Level

□ Low level. □ Mid level. □ Top level.

Years of Experience

□ Less than 5 years. □ 5-14 years.

□ 15-20 years. □ More than 20 years.

Second Section: Questionnaire Questions

This section is seeking about Big Data Characteristics that have three Characteristics: (Volume, Velocity, and Variety). Please read the following questions and tick (√) in the appropriate column which you think is appropriate:

No.	Big Data Characteristics	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Volume					
1.	The use of Big Data volume facilitates obtaining reports to the Business Intelligence.					
2.	The use of large data helps to predict the future decisions.					
3.	Big Data Volume improves data quality.					
4.	Big Data volume is used to reduce the incidence of crises.					
5.	The use of large data helps to extract knowledge for the decision maker.					
6.	The use of large data helps in obtaining correct information.					
7.	The use of large data increases work efficiency.					
8.	Big Data Volume is used to provide objectivity for decisions making.					
	Velocity					
9.	Big Data Velocity is used to provide objectivity in accomplishing tasks.					

10.	Big Data Velocity is used to provide speed in accomplishing tasks.					
11.	Big Data Velocity improves Business Intelligence process.					
12.	The company has sufficient control over Big Data velocity.					
13.	Data can be analyzed on real-time for users.					
14.	Velocity of Big Data is an opportunity to the organization.					
15.	Big Data Velocity increases work efficiency.					
16.	Big Data Velocity increases work effectiveness.					
	Variety					
17.	Big Data Variety is used to provide objectivity for decisions making.					
18.	Big Data Variety improves the Business Intelligence process.					
19.	Big Data Variety increases work effectiveness.					
20.	Big Data Variety increases work efficiency.					
21.	Big Data Variety is used to reduce the incidence of crises.					
22.	Using Big Data Variety helps extract important information.					
23.	Big Data Variety is used to guide policies to help rationalize decisions.					
24.	Big Data Variety is used to make rational decisions.					

Third Section: Study Questions (Business Intelligence).

This section is seeking about Business Intelligence that has three factors: (Organizational, Process, and Technology). Please read the following questions and tick (√) in the appropriate column which you think is appropriate:

No.	Business Intelligence	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
	Organizational					
25.	The information obtained from Business Intelligence is accurate.					
26.	The information derived from Business Intelligence is useful.					
27.	The information derived from Business Intelligence is easily accessible.					
28.	Business Intelligence derived to quality of information.					
29.	The Company has supported the use of Business Intelligence technology.					
30.	The company has skillful for using Business Intelligence techniques.					
	Process					
31.	There is the right skill to be able to process Business Intelligence results.					
32.	There are many changes in process due to the adoption of Business Intelligence.					
33.	Our data storage meets the demands of Business Intelligence processing.					

34.	The company has the right skills to deal with Business Intelligence methods.					
35.	The company has the internal capabilities to deal with the Business Intelligence methods.					
	Technology					
36.	Using Business Intelligence technology allows me to retrieve more information.					
37.	Using Business Intelligence technology improves the quality of decision.					
38.	IT infrastructure supports our Business Intelligence strategy.					
39.	Using Business Intelligence technology is useful for company.					
40.	Using Business Intelligence technology enables to accomplish tasks more quickly.					
41.	Using Business Intelligence technology increases productivity.					

Appendix (2): The Academic Arbitrators

NO.	Professor Name	University
1	Prof. Dr. Ahmad Ali Saleh	Middle East University
2	Prof. Dr. Osama Rabbaba	Middle East University
3	Associate Prof. Dr. Mohhamed AL-Adaileh	Middle East University
4	Associate Prof. Dr. Sameer Aljabali	Middle East University
5	Associate Prof. Dr. Nahla Al-nazer	Middle East University
6	Associate Prof. Dr. Basel Abu Foudeh	Middle East University
7	Associate Prof. Dr. Enas Musa Al-Lozi	Al-Zaytoonah University
8	Associate Prof. Dr. Azzam Abou-Moghli	Applied Science University
9	Associate Prof. Dr. Shaker Qudah	Applied Science University