The Role of Big Data Analytics in Supply Chain "3Fs": Financial Reporting, Financial Decision Making and Financial Performance

"An Applied Study"

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Abstract

Big Data has a big impact on accounting as nowadays it makes new sorts of unstructured data and information accessible via social media, audio, video, photos, and textual information, which can improve financial accounting, reporting, and managerial accounting procedures. Big Data will improve the quality and relevance of accounting information in financial accounting, resulting in increased transparency and utility of information for auditors, management, and stakeholders in the decision-making process. The era of the internet and Big Data Analytics permits the collection of enterprise operations, consumer preferences, and market trends in structured and unstructured information. Big Data is heavily intertwined with financial reporting and financial management because Big Data is required for company management and operation, as well as making better real-time decisions and judgments. Big Data plays a crucial role in human resources, management, marketing, production and operation management, and finance, so it needs to integrate business analytics into a company's strategy. This research used a questionnaire for collecting data that was analyzed using the Statistical Package for the Social Sciences (SPSS).

Questions about major SC decision procedures, their extent of application in the supply chain, and the influence of Big Data analytics on financial reporting, financial decision making, and financial performance were included in the questionnaire. In the quantitative investigation, a sampling questionnaire was utilized to collect data, with a questionnaire as the data collection technique. The original data, acquired from 75 respondents in Egypt who worked in 11 different businesses, has been analyzed. The (SPSS) package was used to evaluate the collected data. The study included a reliability test, descriptive analysis, and frequency analysis. With the advancement of Big Data technology, the question of whether and how to invest in Big Data business for supply chain members to gain a lasting competitive advantage has arisen. The goal of our study was to evaluate Big Data business investment and its long-term effects on the supply chain in terms of financial reporting, decision-making, and performance evaluation. This research seeks to fill the missing gap regarding how Big Data is applied in the supply chain management process. The results reveal that using Big Data enhances supply chain performance and that it can be measured as operational, market, and financial performance.

The findings revealed that today's data environment differs from previous ones in terms of data availability and immediacy, as well as the capacity to access it. The use of Big Data Analytics (BDA) and the technologies that use it presents finance and management accounting professionals with both opportunities and challenges. Accounting and finance professionals must take advantage of opportunities to create value around Big Data in order to stay relevant.

Keywords: Big Data; Big Data Analytics; Supply Chain; Supply Chain Management; Financial Reporting; Financial Decision Making; Financial Performance; Egypt

دور تحليلات البيانات الضخمة في سلسلة التوريد "3 Fs": إعداد التقارير المالية واتخاذ القرارات المالية والأداء المالي "دراسة تطبيقية"

مستخلص البحث

البيانات الضخمة لها تأثير كبير على المحاسبة لأنها تتيح في الوقت الحاضر أنواعًا جديدة من البيانات والمعلومات غير المهيكلة التي يمكن الوصول إليها عبر وسائل التواصل الاجتماعي والصوت والفيديو والصور والمعلومات النصية ، والتي يمكن أن تحسن من إعداد التقاريرالمالية والمحاسبة الإدارية. ستعمل البيانات الضخمة على تحسين جودة وملاءمة المعلومات المحاسبية في المحاسبة المالية ، مما يؤدي إلى زيادة الشفافية ودور المعلومات المقدمة لأصحاب المصلحة في عملية صنع القرار. يسمح عصر الإنترنت وتحليلات البيانات الضخمة بجمع معلومات مالية كثيرة ويتم دمج البيانات الضخمة بشكل كبير مع التقارير المالية والإدارة المالية لأن البيانات الضخمة ضرورية للإدارة والتشغيل ولاتخاذ قرارات أفضل. تلعب البيانات الضخمة دورًا مهمًا في الموارد البشرية والإدارة والتسويق والإنتاج وإدارة العمليات والتمويل، وبالتالي من الضروري الأهتمام بدور تحليل البيانات الضخمة في إستراتيجية الشركة. استخدم هذا البحث استقصاء لدراسة دور تحليل البيانات الضخمة علي التقارير المالية والأداء المالية واتخاذ القرارات المالية، ومدى استخدامها في سلسلة التوريد. تم استخدام حزمة (SPSS) لتحليل البيانات التي تم جمعها من الأستقصاء.

يسعى هذا البحث إلى سد الفجوة في الدراسات السابقة فيما يتعلق بكيفية تطبيق تحليل البيانات الضخمة في عملية إدارة سلسلة التوريد وبيان مدي تأثيراته طويلة المدى على سلسلة التوريد من حيث التقارير المالية واتخاذ القرار وتقييم الأداء المالي للحصول على ميزة تنافسية. وتكشف النتائج أن استخدام تحليل البيانات الضخمة يعزز أداء سلسلة التوريد ويمكن قياسه من خلال تحسن الأداء التشغيلي والسوقي والمالي لسلسلة التوريد. يهدف هذا البحث إلى التحقيق في كيفية دعم تحليلات البيانات الضخمة عملية إعداد التقارير المالية وفي تقديم المعلومات في الوقت الفعلي لاتخاذ القرارات الإدارية والمالية وتعزيز الأداء المالي في سلاسل التوريد.

لذا، فإن الهدف الرئيسي من هذا البحث هو استكشاف مدي تطبيق تحليل البيانات الضخمة في سلسلة التوريد ودورتحليل البيانات الضخمة من وتأثيرها علي كلاً من: التقارير المالية واتخاذ القرارات المالية والأداء المالي.

قامت الباحثة بجمع البيانات باستخدام أستقصاء. تم جمع البيانات من ٤٣ شركة مدرجة في البورصة من مختلف الصناعات في مصر. تم جمع البيانات الخاصة بهذا البحث من خلال استقصاء موحد تم إرساله عبر البريد الإلكتروني. يركز هذا البحث على تحليل البيانات الضخمة. تم توزيع الاستبيان على ١١٠ شخص وأتت الإجابات الكاملة لجميع الأسئلة من ٧٥ شخصًا ، لذلك تم التعامل مع الإجابات الكاملة فقط ،

وتم اختيار المشاركين في الدراسة من الشركات التي كانت مهتمة باستخدام Big Data في خطة تحسين سلسلة التوريد الخاصة بهم. تضمن الأستقصاء أسئلة حول البيانات الضخمة ومستوى استخدامها في سلسلة التوريد.
أشارت نتائج البحث أن تحليلات البيانات الضخمة توفر المعلومات المهمة في الوقت المناسب ، مما يسمح للشركات باتخاذ قرارات مالية أفضل في كل ما يتعلق بأنشطة سلاسل التوريد حيث يمكن أن يؤدي التحليلات المتطورة للبيانات الضخمة على توفير قيمة للمؤسسة ، مما يسمح للمؤسسات بالحصول على فهم أفضل لعملياتها وتحسين عملية التنبؤ. ويجب على المنظمات التي لا تريد التخلف عن منافسيها تخصيص موارد كافية لأستخدام أدوات التحليل المتقدمة للبيانات الضخمة (ذات الحجم الكبير). وتشير النتائج إلى أنه يمكن استخدام البيانات الضخمة لتحسين الأداء المالي عبر المؤسسة ؛ ومع ذلك ، فإن تأثيرها المحتمل على تقييم الأداء أكبر. يتم استخدامه لتقييم أداء الأفراد والعمليات والآلات والعناصر الأخرى بشكل موضوعي.

الكلمات المفتاحية: تحليلات البيانات الضخمة؛ سلسلة التوريد؛ إدارة سلسلة التوريد؛ التقرير المالى؛ صنع القرار المالي؛ الأداء المالي؛ مصر

1. Introduction

Accounting communicates economic information that allows informed decisions by interested users (managers, investors, creditors, the government, and the employees). Financial accounting records transactions and management accounting provides useful information for decision making to ensure effective resource allocation, planning, and control to optimize cost, time, and asset utilization.

Business accountants have numerous options to use various data sources and new analytics tools. These can aid forecasting by including non-financial variables or utilizing more real-time data. Linking non-financial and financial data can also help with cost driver analysis. Granular data can aid in the deep study of controls and operational processes, allowing for the identification of problems or pressure spots that can be addressed. Furthermore, accountants in advisory roles can use these tools to assist organizations with company strategy and operations.

Big Data refers to the large amount of unstructured data that is continually generated and collected through devices and

technologies (such as social media, Wi-Fi sensors, and electronic tags). The use of social networking is rapidly increasing, and businesses are receiving a massive amount of customer data. Big Data has become a popular buzzword in the IT sector, with applications in a variety of fields. For example, Big Data has been successfully used in financial transactions to prevent and detect fraud (Jha et al. 2016).

Big Data is a term for data sets that are vast, complicated, or demand rapid processing (also known as the Volume/Variety/Velocity problem) that are difficult or impossible to work with using normal database administration or analytical techniques. Massively parallel software running on tens, hundreds, or even thousands of servers is sometimes required when manipulating large data sets like this. The expansion of social media, video, photographs, and unstructured text, as well as data collected by ubiquitous sensing devices such as smart phones, are all contributing to the growth of Big Data. Capture, storage, search, sharing, analysis, and data visualization are just a few of the challenges that come with Big Data.

Big Data is used to describe massive data sets that are so large that they can no longer be stored in memory. This data can be collected, saved, shared, analyzed, and aggregated. As the amount of data has increased, so has the necessity to update the tools that are used to analyze it. This data should not be organized into neat columns and rows as they were in the past in order to be analyzed by modern technology. Big Data incorporate a wide range of data from a variety of sources. They can be organized, semi-organized, or completely unorganized. Big Data is made up of numerical data, visual data, speech, text, and discourse, to name a few categories. They can take the form of Radio-Frequency Identification (RFID), Point-of-Sale (POS), Global Positioning System (GPS), Instagram or Twitter feeds, call centers, Facebook or consumer blogs, among other things.

Questions about major SC decision procedures, their extent of application in the supply chain, and the influence of Big Data

analytics on financial reporting, financial decision making, and financial performance were included in the questionnaire. In the quantitative investigation, a sampling questionnaire was utilized to collect data, with a questionnaire as the data collection technique. The original data, acquired from 75 respondents in Egypt who worked in 11 different businesses, has been analyzed. The (SPSS) package was used to evaluate the collected data. The study included a reliability test, descriptive analysis, and frequency analysis. With the advancement of Big Data technology, the question of whether and how to invest in Big Data business for supply chain members to gain a lasting competitive advantage has arisen. The goal of our study was to evaluate Big Data business investment and its long-term effects on the supply chain in terms of financial reporting, decision-making, and performance evaluation. This research seeks to fill the missing gap regarding how Big Data is applied in the supply chain management process. The results reveal that using Big Data enhances supply chain performance and that it can be measured as operational, market, and financial performance.

The findings revealed that today's data environment differs from previous ones in terms of data availability and immediacy, as well as the capacity to access it. The use of Big Data Analytics (BDA) and the technologies that use it presents finance and management accounting professionals with both opportunities and challenges. Accounting and finance professionals must take advantage of opportunities to create value around Big Data in order to stay relevant.

Data is now regarded as an intangible asset for organisations that create value and support their strategy.Thus, organizations need for Big Data collection and analysis develop Big Data return on investment model. Financial accountants need to adopt by themselves Big Data predictive analytical tools to perform better financial and non-financial data analysis for improved real time, informed decision making and in developing organization key performance indicators for control and measurement. In order to bring value to their organizations, management

accountants as business partners must be equipped with new data analytical tools for structured internal information like customer data as well as external unstructured data like tweets, emails, and videos (Kristine Brands 2014).

With today's advanced analytical technology, we can extract insights from any type of data. Analytics is a combination of math and statistics applied to massive amounts of data. Big Data and analytics (BDA) refers to the use of statistics and arithmetic to analyze large amounts of data. Big Data without analytics is just a bunch of data, thus integrating the two creates a set of tools that assist decision makers in gaining important insights and turning data into business knowledge (Darvazeh et al. 2020).

Big Data mining is a paradigm shift that includes the tracing and extraction of economic activities and information from huge data sets, in order to discover, display, and visualize the unknown and hidden relationships and dependencies for supporting strategic, operational, and financial decision-making in a way that brings benefits to the organization’s performance (Sun et al. 2018).

The supply chain is composed of a variety of companies, ranging from raw material suppliers to producers/central organizations, wholesalers, retailers, customers, and end users. The supply chain involves information and financial transactions in addition to physical flows involving the transfer of commodities and goods (Darvazeh et al. 2020). According to contemporary data development, Big Data can be leveraged to boost business competitiveness. Because a large volume of data is generated every minute in today's corporate environment, there is a huge opportunity. The majority of businesses use Big Data to improve their operations on a regular basis. In data analytics, there are four steps that are often used: The first step is to make sure that the data is clean, structured, and organized so that it can be analyzed further. The second stage is to verify that the correct data is available in the correct format, at the correct time, and in the correct location. The third step is

quantitative analysis, such as descriptive analytics. Advanced analytics, such as predictive analytics, automated algorithms, and real-time data analysis, are used in the fourth step. Using Big Data in the final step requires extensive knowledge of sophisticated data analytics (Sanders 2016).

The main objective of any business organization is to develop valuable products within a given market. The use of Big Data in business is critical to its success because it integrates technology with business-oriented production activities, allowing business entities to analyze historical data and scan the market for emerging trends. Thus, it can transform the effectiveness and cost of activities like the development of new products, new market targeting, and pricing (Raza and Ali 2016). Big Data analysis becomes both a strategic planning and decision-making tool and commercial as information analysis about markets and customers, etc., provides an opportunity for businesses to create new revenue streams and have a sustainable competitive advantage (WU Mingjing 2017).

2. Research Problem

Big Data is considered a liability and also an asset for a business, as data worth less over time as it depreciates and becomes obsolete in value. The evolution of information technology, increased customer expectations, economic globalization, and other modern competitive priorities has caused firms to adjust in today's competitive environment. As a result, rivalry between businesses is replaced by competition between businesses and their supply chains. In today's competitive market, supply chain experts are having difficulty dealing with large amounts of data in order to achieve an integrated, efficient, and successful supply chain. As a result, the supply chain's rapid growth in volume and variety of data types has demanded the creation of systems that can intelligently and swiftly analyze massive volumes of data. One of the most successful techniques for supporting organizations in resolving their difficulties is to implement a Big Data Analytics capability

(BDA). BDA is a programme that extracts valuable patterns and information from enormous amounts of data (Darvazeh et al. 2020). **However, research on BDA capabilities in the supply chain is very limited, and therefore, a comprehensive investigation of BDA capabilities is required to exploit the benefits of Big Data in terms of the 3Fs: *financial reporting, financial decision making, and financial performance.***

3. Literature Review and Hypotheses Development

3.1 Big Data Analytics and Supply Chain

Big Data is a high-volume and variety of unstructured data that requires cost-effective, certain innovative techniques and technologies of advanced predictive analytics and information processing that enhance effective fact-based decision-making processes to create and add value to the company, predict risk and be used in planning, budgeting and management control processes.

The main competition nowadays within the market is between supply chains, so the use of innovative information technology is critical for SC optimization.

A supply chain (SC) is a network of different organizations that involve an upstream and downstream flow of products, information, and money starting from initial suppliers to ultimate customers (Christopher 1992). In addition, SC includes customer service and relationship management, supply management, demand management, manufacturing, and return management. A supply chain is a network of suppliers of the suppliers, producers, transporters, retailers, and customers of the customers. Supply chain management is managing money, information, materials, and products or services in a supply chain. Choi et al. (2018) explained how applying Big Data analytics (BDA) in Supply Chain Management (SCM) affects forecasting, revenue management, risk analysis, etc., and decision-making processes.

SCM faces the uncertainties in demand, capacity, and cost arising from variations in customers' demand, supplies, transportation, organizational risks and lead times that have an impact on the whole SC performance (Mahya and Fereshteh 2020).

Businesses are expanding their precision marketing efforts in order to stay competitive and retain or grow their profit margins. As a result, forecasting models are commonly used in precision marketing to understand and meet the wants and expectations of customers. As a result, there is a rising focus on analyzing consumer behavior and preferences utilizing forecasts derived from customer data and transaction records in order to better manage product supply chains (Guo et al. 2013).

SCM is concerned with the flow of goods, services, and information from points of origin to customers via a network of interconnected entities and activities. Capacity, demand, and cost are presumed to be predictable parameters in most SCM situations. In practice, however, there are uncertainties resulting from variances in customer demand, supply transportation, organizational risks, and lead times. Demand uncertainty has the largest impact on SC performance, with implications for production scheduling, inventory planning, and transportation. In this sense, demand forecasting is an important tool for tackling supply chain uncertainties (Gholizadeh et al. 2018).

Supply chain managers can monitor these flows and utilize the results to better achieve their duties by combining planning, implementing, and regulating the flow for business excellence and delivering value to stockholders and customers (Lambert et al. 1998; Lambert and Cooper 2000). Customers, sales, markets, service level needs, demand predictions, inventory, capacity deployment, quality control, human resources, skill levels, logistics, warehouse planning, and pricing are the most common types of information available in a supply chain. In a supply chain, Big Data can have a favorable impact on demand forecasting, inventory management, production and service scheduling, and product development.

SCM is in charge of establishing and maintaining relationships between the many entities in a company that are responsible for procuring raw materials and delivering the finished product. New technologies like Big Data analytics synchronize SCM in a distinct stream, allowing businesses to acquire, process, analyze, store, and share data about their operations.

Due to advancements in information technologies and improved computational efficiencies (Awwad et al. 2018), big data analytics has emerged as a means of arriving at more precise predictions that better reflect customer needs, facilitate assessment of SC performance, improve SC efficiency, reduce reaction time, and support SC risk assessment, due to advancements in information technologies and improved computational efficiencies (Awwad et al. 2018).

Dealing with a variety of suppliers, manufacturers, logistic providers, and other entities generates Big Data sets that can be used for supply chain optimization projects. Big Data analytics helps suppliers enhance demand forecasting, reduce safety stock, and improve management procedures. SCM the relationship management between the company and interdependent business organizations starting from suppliers of materials, purchasing and logistics, production facilities, selling, marketing, and distribution, and related systems that facilitate the forward and backward flow of service, materials, finances, and information from the original supplier to the ultimate customer with the aim of adding value, maximizing profit through achieving efficiency and customer satisfaction. Big Data can be applied by different analytic procedures for predictive, prescriptive, and descriptive purposes that will assist companies in making effective decisions for operational and strategic applications (Stock and Boyer 2009).

SCM includes information related to customers, sales, market and competitors, services and products, marketing and promotions, demand forecasting, logistics and inventory, planning for capacity utilization and control information, human

resources, vendor networking information, warehouse planning and pricing information, and, in addition, the return of goods for repair and recycling. Therefore, the role of data is critical in the supply chain. Supply Chain Analytics (SCA) is the application of Big Data in all processes of the supply chain (procurement, logistics, production, inventory, product design and development). Applying SCA assists managers in making well informed tactical and operational decisions; understanding new trends in marketing; identifying and assessing risks, and formulating supply chain strategies; as well as analyzing and measuring supply chain performance, which enhances business improvement both in terms of profitability and flexibility by reducing process variability. The main aim of a supply chain strategist is to aggregate and analye relevant information from a huge amount of diverse data that is generated across the supply chain in order to provide real-time information to be used in current decisions and planning for the future (Biswas and Sen 2016).

Big Data is generated from social networking and media and is unstructured (Sophie and Mark 2018). With the advancement of computational efficiencies, Big Data analytics is used as a means of better forecasting customer needs, assessment of supply chain performance (in terms of store and warehousing, manufacturing, sales, shipping, delivery, and transportation), enhancing the operational and financial efficiency of SC, reducing lead time, and supporting supply chain risk management (Mahya and Fereshteh 2020). Thus, to improve the accuracy of demand forecasts, analyzing supply chain data carefully to provide information about customer behavior, market trends, and suppliers will help in minimizing supply chain costs. Big Data analytics can be used in supplier selection, sourcing cost improvement and risk management, production planning and control, product, research and development, quality management, warehousing and inventory control, logistics and transportation planning, and demand management forecasting.

Systems for managing the supply chain and keeping track of the products that have been sold. Big Data can assist in the development of new goods based on customer needs. Furthermore, with a more precise demand forecast, manufacturers can better plan their supply chain. According to executives, Big Data can aid in the diagnosis of defective items, the improvement of process quality, and the better planning of supply chains (Nedelcu 2013). The system can efficiently implement real-time manufacturing, planning, and scheduling by using data analysis on the shop floor, which is directly affected by both the material delivery time and the real-time information flowing from the production processes. Furthermore, evaluating Big Data can assist the plant management level with the material flow and better plan space limits for material flow and warehousing operations.

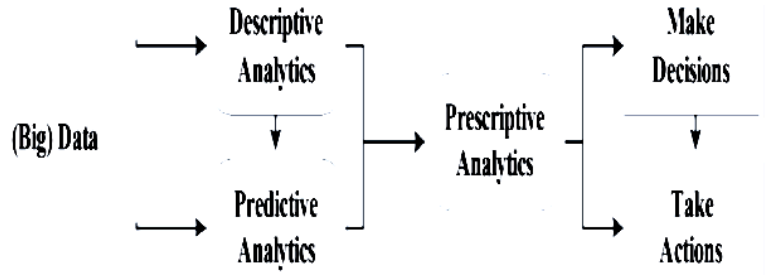


Figure (1): BDA: Descriptive Analytics, Predictive Analytics, and Prescriptive Analytics
Source: (Darvazeh et al. 2020)

BDA has been used in the procurement, warehousing, logistics/transportation, manufacturing, and sales management stages of supply chains. BDA is comprised of descriptive analytics, predictive analytics, and prescriptive analytics, as seen in Figure (1). Descriptive analysis is described as the process of describing and categorizing past events. Predictive analytics uses mathematical methods like data mining, web mining, and text mining to anticipate future events and uncover predictive

patterns within data. Prescriptive analytics uses data and mathematical algorithms for decision-making. Prescriptive analytics technologies like multi-criteria decision-making, optimization, and simulation can help increase forecasting accuracy (Wang et al. 2016).

Supply chain analytics (SCA) is the process of collecting hidden valuable insights from a supply chain utilizing BDA approaches. By minimizing sourcing, transportation, storage, stock out, and disposal expenses. As a result, applying BDA methodologies to supply chain management issues has a favorable and significant impact on supply chain performance (Darvazeh et al. 2020). Manufacturers have found BDA to be a beneficial tool for developing plans, sharing data, designing predictive models, and connecting factories to control processes. To predict future outcomes, BD predictive models leverage relationships between elements (correlations) and patterns.

Companies can use Big Data to better evaluate their suppliers and manage the procurement process (Sanders 2016). Companies can also simulate their supply networks with the help of Big Data. Finding bottlenecks, virtually executing the production process in several locations, and inspecting prototypes are all possible with simulation.

According to Wang (2016), Big Data business analysis can help enterprises measure the performance of the logistics and supply chain management parts, assist supply chain enterprises in making better business decisions, and improve business processes for supply chain enterprises, all of which can result in significant benefits. Li et al. (2018) show that, when paired with the benefits of e-commerce and Big Data, demand chain performance outperforms standard supply chain management methods.

Năstase and Stoica (2010) discussed the association between analytical capabilities and data mining in the planning, logistics and sourcing, production, and delivering areas of business performance using business analytics and business process orientation as moderators. Schläfke et al. (2013) discussed

business analytics in management accountants and performance management systems that could assist managers' decision making process. Bhimani (2015) discussed the software, digitization, and data explosion for the management accounting and finance function in understanding how Big Data analytics helps in extracting data, knowledge, and structured and unstructured information relationships.

Brands and Holtzblatt (2015) investigated how management accountants can play a role in the implementation and application of business analytics, as well as how they can analyse and interpret visual and digital data for their firms to improve operating performance and competitive advantage. Quarttrone (2016) discussed the digital revolution that has involved in management accounting practices in a way that enhances rational decision-making from finance to risk management. Arnaboldi et al. (2017) discussed the relationship between accounting function and social media and Big Data and how they have an effect on communication, support, and customer service and identify constraints in the supply chains.

After reviewing relevant literature, the following hypothesis was developed:

H1. Big data analytics has a significant positive role in the supply chain.

3.3 Big Data Analytics and Supply Chain Financial Reporting

Because data is at the heart of accounting, Big Data can assist accountants in providing greater value to their clients. Transactions and other structured data, such as orders, sales, purchase orders, shipments, receivables, personnel information, time sheets, and inventory, were formerly reported by business and accounting data. For businesses, this data is predictable, organized, and familiar. This sort of data differs from big data in that the former is structured in rows and columns, but the latter is unstructured and can be difficult to deal with due to the

amount, diversity, and type of data. The introduction of big data has altered the role of the management accountant. A company that uses big data has invested large resources in collecting, processing, preparing, and analyzing information, and hence expects deeper insights and knowledge as a consequence (Appelbaum et al. 2017).

Big Data will increase the quality and relevance of accounting information in financial accounting, boosting transparency and stakeholder decision-making. As the dynamic, real-time global economy evolves, Big Data can help with the design and improvement of accounting standards, ensuring that this profession continues to deliver meaningful information (Warren et al. 2015).

In financial accounting, there are two distinct big data trends. For starters, various data sources are being integrated into accounting information systems. Text, video, and audio data, for example, are increasingly being linked to traditional data. Accountants must improve their data analytic abilities in order to deal with vast amounts of data, particularly data that has been automatically mined (such as customer purchases, URL click through tracking, and content engagement data). Second, fair value accounting is an area where big data could have a significant impact. Big data relevant to the fair value of assets and liabilities could limit subjective assumptions in fair value estimations thanks to data service firms specializing in gathering and evaluating designated data from multiple sources (Rezaee et al. 2018).

Traditional auditing methods based on sampling are being replaced by the ability to evaluate complete data sets—in some cases, billions of transactions in a ledger. While auditors will continue to work in depth on smaller samples of data, audit analytics allows them to spot anomalies and exceptions and concentrate on the most dangerous regions. They can also display the data, combine financial and non-financial data, and compare anticipated results to the real world using a variety of analytics tools.

Accounting duties are data-driven. As a result, advancements in the ability to gather, process, store, analyze, visualize, and distribute data will have a significant impact on how accountants work.

The accounting profession may now use new data capabilities to dramatically improve decision-making across enterprises. There are numerous examples of Big Data being used to gain new insights into firms, focus attention on areas of greatest risk, and improve prediction and forecasting across the profession. This can assist accountants in providing greater assurance on financial statements, improving financial resource management, and providing more decision support to business activities. However, many accountants are still in the early phases of using Big Data and advanced analytics in practice, and there are still enormous prospects to be achieved.

Data also allows accountants to expand their responsibilities to include data stewardship across the entire organization. Accountants are well positioned to assist firms in making efficient use of Big Data and sophisticated analytics because of their discipline, structure, and ethical approach.

Increases in processing power have made it feasible to collect and process data from a variety of different sources, including the following:

- Clickstream data, such as searches, sites visited, and commodities viewed, as well as actual transactions, are available on the internet.
- New sorts of data have emerged as a result of social media, such as status updates, comments, and likes, images, videos, and contact networks.

- Mobile technology makes it easier to create social media and internet data, as well as fresh data on people's whereabouts.

- The release of significant amounts of predominantly public sector data, such as geospatial data, transportation data, government financial data, and public service data, is referred to as "open data."
- The internet of things entails the incorporation of computer chips and sensors into physical assets such as machines, buildings, household appliances, and clothing, which subsequently generate data.

In accounting, the purpose of big data is to gather, organize, and tap data from a variety of sources in real time to acquire new business insights. Accountants and financial analysts, for example, can access up-to-the-minute data from any location with a network connection, rather than relying on monthly financial reports for their assessments.

- Unstructured data, such as audio, video, and photos, as well as email and text files, social network posts, website content, and data gathered from mobile devices, can now be included in their analysis. Analysts were formerly restricted to assessing data that could be translated to a structured format, such as a spreadsheet or relational database.
- Big data enhance risk analysis by allowing accountants to access more up-to-date information. They can process the data rapidly due to the advanced analytics technologies.
- Auditors may now process bigger amounts of accounting data in a variety of formats at the same time, allowing them to do their work more quickly and accurately.
- Analyzing the evidence that backs up their decisions.

In three key areas, data presents an opportunity to improve the quality of accounting services:

- **Data governance and privacy:** Accounting companies must check their compliance with legislation relating to the security and appropriate use of sensitive information in big data applications due to the substantial use of personal information.
- **Gaining business insights:** Accountants and other financial professionals will need to collaborate more closely with business managers to gain a deeper understanding of the processes and functions they rely on, as well as better support the business choices that affect those processes.
- **Risk management:** Company executives must have a greater awareness of the external forces that affect their operations, such as regulations, supply-chain disruptions, and risks to the company's reputation and brand. They must also be informed about obstacles to the company's growth and product initiatives.

Businesses are generating more data internally that they may use when they use digital technology in areas like sales and marketing, customer management, supply chain, and internal communications. Furthermore, advances in semi-structured and unstructured data management enable businesses to better utilize a number of existing and new data sources, including email and text, photos, and voice.

Accounting and finance data includes a broader view of transactional and operational internal and external data that can be used for forecasting and analysis (Sophie and Mark 2018).

Big Data integrates different data sources into accounting information systems such as audio, video, and text data that are gradually linked with traditional data.

Also, Big Data has a great impact on fait value accounting related to collecting and evaluating financial data pertaining to

the market values of assets and liabilities in a way that can reduce any subjective estimates (Warren et al. 2015).

In managerial accounting, using Big Data will enhance the development of control systems, effective management and budget preparation. Also, in the field of financial reporting, it will help in the development of GAAP and the refinement and creation of accounting standards in a way that puts emphasis on the protection of sensitive data as well as account disclosure (Zabihollah and Jim 2017).

All events or transactions that affect the value of a company's net assets, and hence the wealth of common shareowners, must be recognized in real time by a trustworthy financial reporting system. Financial statement disclosures should include information that allows stockholders to understand how the reported statistics were calculated, including the models employed. Furthermore, all risk exposures must be explained, as well as the potential effects of future events on investors' wealth.

Accounting can be considered a craft because it entails approaches aimed at achieving certain practical goals, and the instruments of the craft are usually subject to a system that leads to gradual evolution. Accounting has constantly adjusted to corporate needs and technical innovations throughout its history. For example, business needs prompted the development of double-entry bookkeeping, which is a written representation of a merchant's operations. From the recording of financial transactions through the presenting of financial reports, accounting attempts to provide financial investment information both internally and externally. Sharing relevant data that aids users in evaluating an enterprise's performance and, as a result, rationalizing their decision to invest in such entities is part of the information disclosure process. Due to rapidly evolving technology, accounting and data have a strong interdependency as a result of ongoing business activities, and auditing has seen growing opportunities and challenges.

After reviewing relevant literature, the following hypothesis was developed:

H2. Using of Big accounting data analytics in the supply chain leads to improving the efficiency of financial reporting.

3.4Big Data Analytics and Supply Chain Financial Decision Making

In today's corporate world, financial decision-making is increasingly centred on first understanding the numbers and what they disclose, and then applying that knowledge to make informed business decisions. Financial decision-making is frequently portrayed as a rational process in which individuals make judgments based on coldly rational, mechanistic data collection, integration, and analysis. Prior knowledge and experience are recalled and merged with information in decision making, which is a dynamic, contextual, and personal/group action.

Big data tools sift through vast volumes of digital data in search of relevant connections. Technologies can provide speedy and reliable information to improve decision-making with the use of increasing processing power (Davenport 2014).

Big Data Analytics (BDA) can play a critical role in altering and improving supply chain functions as a significant asset for decision-making. Business leaders want to make judgments based on data-driven insights rather than their intuitions in today's shifting business climate (Davenport 2006). Organizations are highly motivated to increase their technological and organizational capacities to extract value from data due to the perceived benefits of BDA. The process of evaluating, cleaning, transforming, and modelling Big Data in order to identify and communicate important information and trends, suggest conclusions, and aid decision-making is known as Big Data Analytics (Warren et al. 2015).

In today's fast-changing and dynamic market environment, BDA technology could help organisations strengthen their skills (Meredith et al. 2012). The decrease of cycle time, cross-functional perspectives, decision-making process enhancement, and supply chain performance optimization are all advantages of Big Data for supply chains. Big data, for example, can reduce the whip effect in a supply chain by lowering the uncertainty of future demand.

Risk management approaches are used at some level in any supply chain that deals with uncertainty in its decision-making processes. One of the implications of a lack of information is risk, and Big Data can help to alleviate this problem (Shang et al. 2017).

Advanced business intelligence, enterprise resource planning systems, and data analytics have freed up time for more future-oriented duties like business and process development for controllers. New analytics technologies also allow for a more in-depth and faster analysis of accounting data, which can be utilized to spot trends and make better business decisions (Bhimani 2013).

Decisions that were previously reliant on guesswork can now be made using data-driven mathematical models, according to Moorthy et al. (2015). This provides a precise foundation for making decisions. Big data can be used to forecast in a variety of ways. With more data and good analysis, better predictions about the competitive environment can be formed. Future sales and cash flow, raw material demand, financial status, and long-term trends can all be forecasted. Sales estimates can be made and communicated to management in the same way.

Big Data is defined as high-volume, high-velocity, high-variety, high-value, and high-veracity data that necessitates innovative data processing techniques to enable better insights, decision-making, and process automation (Nguyen et al. 2018; Benabdellah et al. 2016).

- **Volume:** In SCs, volume refers to the large amount of data acquired from various sources (spatial dimension) and over a long period of time (temporal dimension). Sensors, bar codes, Enterprise Resource Planning (ERP), and database technologies are used to generate this information.
- **Velocity:** can be described as the pace at which certain data is generated and delivered; in other words, it refers to the speed at which data is collected, transferred, stored, and excavated for usable knowledge in relation to decision-making models and algorithms.
- **Variety:** refers to the ability to generate a wide range of data kinds from a variety of sources, including the Internet of Things (IoT), mobile devices, online social networks, and so on.
- **Value:** refers to the type of data that must be found in order to aid decision-making. Of the five Vs, Value is the most crucial but also the most illusive.
- **Veracity:** refers to the accuracy and trustworthiness of data, despite the fact that many data sources may contain uncertainty and unreliability. The term "veracity" refers to the consistency and correctness of data. Data from many sources and formats should be combined, filtered, and confirmed.

Data collection, storage, and analysis become easier and less expensive when big data is used. It also improves information accessibility, visibility, and transparency. These new methodologies enable organizations to discover new patterns and relationships in data on a scale that was previously unattainable without big data, which can result in a number of benefits for organizational decision-making. Initially, these strategies may result in more precise and predictive management than previously (Frizzo-Barker et al. 2016).

Big Data analysis has been acknowledged as a significant technology for data gathering, storage, and analysis in modern

manufacturing data management systems. Wang and Alexander (2015) show how Big Data may aid in the visualization of the entire supply chain, increase business operational efficiency, and provide real-time information to aid in important decision-making.

Information that was previously rejected by information systems can now be linked to economic transactions and used in decision-making thanks to big data. Organizations can now collect data through new channels, such as social media, smart phone applications, and other internet-based gadgets, as previously indicated. For operational difficulties, real-time responses are required, but activities driven by strategic information must be addressed independently. The goal is to transform unstructured data into structured information that can be examined and used in both strategic and operational decision-making. In this change, finance functions and management accountants can play a critical role (Bhimani and Willcocks 2014).

Data created is rapidly expanding as a result of technological developments throughout supply chain entities. Until the adoption of information technology in the supply chain, the information flow was documented using physical documents. The majority of information flow associated with material flow is now documented as digital structured data. Because the breadth of the supply chain is now global, the volume of data collected from its many activities, as well as the rate at which it is generated, can be classified as Big Data.

In conclusion, Big Data analytics techniques can handle a vast number of complex datasets that are challenging to process and evaluate using standard methods (Beyer 2012). Product development, market demand estimates, supply decisions, distribution optimization, and customer feedback can all benefit from the use of Big Data (Awwad et al. 2018). Furthermore, organizations such as marketing and sales are now depending on the analysis of unstructured data in addition to structured data to

acquire a better understanding of client needs and reduce the cost of supply chain procedures.

After reviewing relevant literature, the following hypothesis was developed:

H3. Using of Big accounting data analytics in the supply chain leads to better financial decision-making by managers.

3.5 Big Data Analytics and Supply Chain Financial Performance

Big Data analytics (BDA) enables better data-driven decision making as well as new ways to organize, learn, and innovate, strengthening customer relationship management, operational risk management, operational efficiency, and overall company performance (Kiron 2013).

BDA is one of the most important factors determining organizational success. By advancing BDA, businesses can gain a better understanding of their customers' needs, provide appropriate service to meet those demands, increase sales and profits, and expand into new areas.

The volume of data collected, as well as the speed with which it is delivered, has resulted in significant advancements in structured and unstructured data analysis, allowing for a better knowledge of customer desires and cost-related aspects of supply-chain activities. Product development, market demand forecasting, supply decisions, distribution optimization, and consumer feedback, among other things, may benefit from Big Data analytics.

Previous studies by experts have identified many benefits associated with optimizing SCM information technology. For example: (1) Information exchange between SC stakeholders. (2) Transform business processes within and between organisations (cancellation, redesign, automation) to increase operational efficiency and sales, improve profitability, and strengthen stakeholder relationships.(3) Improve relationship and contractual governance by effectively reducing partner

opportunism. In addition, the BDA may create future opportunities for stakeholders, including gaining a competitive advantage and reducing the risk of fraud and other malfunctions (Hagstrom 2012; Sethuraman 2012; Kenny 2014; Vasan 2014; Abdul Moktadir et al. 2019; Zhang 2019).

Mithas et al. (2011) proposed a complementary conceptualization of the relationship between a firm's information management capability and organizational performance, claiming that information management capabilities support the development of three key organizational capabilities that can lead to superior organizational performance: customer management, performance management, and process management.

Big Data alters the way supply chains are planned and handled from the standpoint of supply chain and operations management. Big Data can help supply chain companies regulate inventories and optimize and improve manufacturing processes, lowering internal costs associated with production, sales, and stocks. Data-driven decision-making is proven to be more productive than low-performing competitors among the top three firms in a given industry. Big Data technology also alters businesses' business and profit models, allowing them to obtain a competitive advantage through differentiation and achieve quick performance growth (McAfee and Brynjolfsson 2012; Waller et al. 2013; Hazen et al. 2014).

According to Brynjolfsson et al. (2011), companies that make decisions based on data and business analytics do better. This is determined not only by output productivity, but also by other profitability and market value indicators. The availability and use of reliable information for decision-making, which is generated by big data, enables this better performance.

After reviewing relevant literature, the following hypothesis was developed:

H4. Using of Big accounting data analytics in supply chain can enhance financial performance.

3.6 Examples for the use of Big Data in Supply Chain: Financial Reporting, Financial Decision Making and Financial Performance

Big Data guarantees provide rapid, superior, detailed, and high quality information that is obtained from automatically deducing machine learning algorithm interactions.

Big Data changed the role of professional managerial accountants in businesses from decision-making supporters to partners in business, in a way that enhanced business value rather than only based on their management opinions and conflicts of interest (Zabihollah and Jim 2017).

Big data can enhance the improvement of performance management systems in areas of benchmark metrics acquired from the financial electronic services provider and assess if the company's performance is satisfactory or not.

Big Data brings together disparate data sources in a way that increases opportunities to enhance management reporting through comparing financial and non-financial measures of performance.

Adopting big data analytics uses visual analytics to monitor financial stability. This allows the transformation of traditional management through the application of integrated control and monitoring systems by helping in the identification of new motivational measures and variables that were not previously considered, such as new measures for employee morale and customer satisfaction measured by video and audio evidence. Big Data analytics improves data quality in terms of accuracy, completeness, timeliness, and integration of data from different databases (Sophie and Mark 2018).

Businesses can use Big Data to gain a better understanding of their operations, customers, risks, and markets. For example,

1. **Assist in the Fair Valuation of Assets: by employing robust valuation methodologies.**
2. **Use of Big Data in Decision Making:** Big Data radically altered the visibility and profile of real-time internal and external data in business. Thus, it offers real-time decision-making support through working in partnership between business units to share data with external and internal stakeholders. Real-time analytics helps companies reduce logistics and distribution costs and keep pace with customer demand through using sales data to predict global demand. In addition, effective analysis of real time customer information, market research, and future development are important for decision-making.
3. **Improving Supply Chain Traceability:** Better traceability ensures that commodities are tracked from manufacture to retail. Improved traceability can help with the seamless flow of commodities and the integration of multiple supply chain organizations. With stronger tracking capabilities, supply chain activities may be better controlled.
4. **Improving Predictions on Customer Needs and Preferences**: Smart businesses will use Big Data to gain a complete 360-degree perspective of their customers, allowing them to better foresee their needs, understand their preferences, and provide a unique brand experience (Awwad et al. 2018). BDA allows for the detection of new market trends as well as the identification of the core causes of problems, failures, and flaws.
5. **Use of Big Data in the Management of Risk:** Big Data analytics is used to provide predictive analytics to identify risks in real-time through offering expanded data resources that are used in predicting risks to examine the risk of long-term return on investments in new products and markets (Schlegel 2014 and Awwad et al. 2018).
6. **Use of Big Data in Performance Evaluation:** Organizations can use it to objectively measure the performance of their processes, employees, machinery, etc.

7. **Use of Big Data in Strategy Formulation and Implementation:** Deploying Big Data analytics technologies and techniques in the formulation of organization strategies at both the executive, operational, and departmental levels will deliver competitive advantage and organizational performance.
8. **Improved Operational Efficiency:** Efficiency has improved and bottlenecks have been removed as a result of operational managers' ability to continuously monitor and analyze operational data, as well as better access to metrics. Big data improves supply chain efficiency and performance (Choi et al. 2018).
9. **Maximized Sales and Profits: By using real-time data, financial managers can continuously monitor and evaluate this data, as well as manage profit margins with greater understanding.**
10. **Increased Customer Service Satisfaction:** Operational managers will be able to match their inventory levels with customer orders and preferences due to real-time data and the ability to analyze them quickly. This will improve customer satisfaction (Bertsimas et al. 2016).
11. **Data analytics allows manufacturers to properly assess each person's activities and tasks through fast and accurate data analysis of each phase of the manufacturing process, as well as a thorough examination of the entire supply chain. Manufacturers can use this technology to discover bottlenecks and uncover inefficient processes and components (Feng 2018).**
12. **New Product Design and Development:** For product design and development, BDA approaches were utilized, resulting in the manufacturing of new items based on customer preferences. When BDA is used in product design, it allows the designer to be continually aware of the preferences and expectations of the customer, allowing them to create a product that meets their demands and preferences.

4. Research Aims and Questions

Big Data emphasis on visualized reporting processes and interactive modelling, Big Data helps enhance data-driven decisions by helping the business through the use of different visualization techniques, analyze different datasets and translate new data insights into company value. The main objective for Big Data analytics is to enhance decision-making related to costs, customer segmentation and pricing, target new markets, supply chain risk management, and ultimately enhance operational performance. This research aims to investigate how Big Data analytics assists in the financial reporting process, in generating real-time information for managerial and financial decision-making, and in enhancing financial performance in supply chains.

So, the main aim of this research is to explore the application of BDA in the supply chain and to exploit the benefits of Big Data in terms of the 3Fs: financial reporting, financial decision making, and financial performance.

The central questions of this research are constructed as follows:

Research Question 1: What is the role of the deployment of Big Data analytics in the supply chain?

Research Question 2: What is the current state of deployment of Big Data analytics in the supply chain and of its impact on financial reporting?

Research Question 3: What is the current state of deployment of Big Data analytics in the supply chain and of its impact on the supporting financial decision-making process?

Research Question 4: What is the current state of deployment of Big Data analytics in the supply chain and of its impact on businesses' financial performance?

5. Research Conceptual Framework

In this research, three dependent variables (namely financial reporting, financial decision making, and financial performance) are influenced by the independent variable, using Big Data

analytics in the supply chain. The following diagram presents an overview of the research conceptual framework.

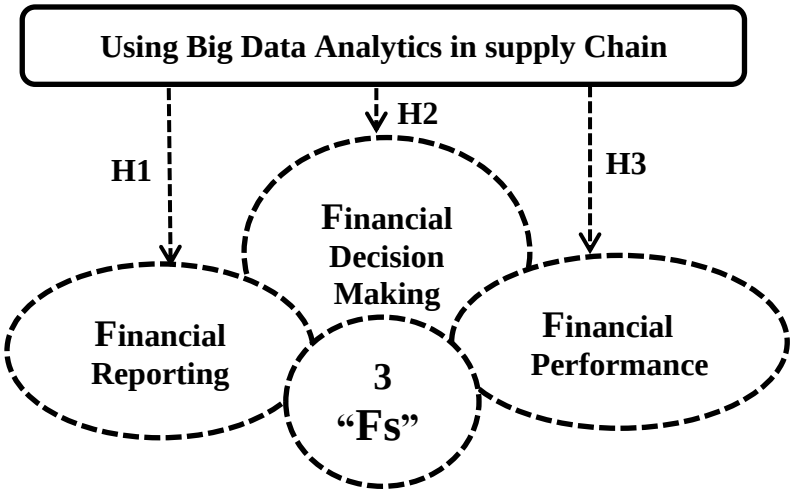


Figure (2): Using Big Data Analytics in Supply Chain: Financial Reporting, Financial Decision Making and Financial Performance

6. Research Methodology

The population of this research was all companies from different industries. Therefore, the results can be compared within industries. The questionnaire was distributed to different titles and responsibilities in the organization, and therefore, they had different focus areas in their company.

The initial data for this study were gathered using a standardized self-completed questionnaire. Sampling, design of questions, and data collection were conducted by the researcher.

The researcher gathered quantitative data using a primary research approach involving a survey analysis methodology. The data was collected from a sample of 43 listed companies from different industries based in Egypt. The data collection for this research was gathered with a standardized online questionnaire sent to recipients via email. This research focuses

on the analysis of the data. The questionnaire was distributed to 110 people, and the complete answers to all questions were given to 75 people, so only the complete answers were dealt with, so there were 75 respondents to the questionnaire. The study participants were selected from firms that were interested in using Big Data in their supply chain improvement plan. The survey included questions about Big Data practices and their level of use in the supply chain. The literature review was used as the basis for developing the survey questions.

At the beginning of the questionnaire, the respondents defined their area of responsibility in the organization as well as the industry in which they operate. 25% of respondents were in top management. 33% were in the IT-section (IT managers), 20% were in the accounting and finance department (CFO or business controller), 8% worked in the sales and marketing department, 9% in the business development department, and 5% in the production and logistics department.

The 43 companies who answered the survey operated in a variety of industries, which are categorized as follows: 7 companies operated in the Industrial Goods, Services, and Automobile Industries; 4 in Health Care & Pharmaceuticals; 3 in Paper & Packaging; 4 in Real Estate; and 5 in Basic Resources. Six in Food, Beverage, and Tobacco, three in Shipping & Transportation Services, three in Building Materials, three in Trade & Distributors, two in Textiles & Durables, and three in Contracting & Construction Engineering.

The questionnaire has 56 questions and concerns big data role in supply chains and its impact on financial reporting, financial decision-making, and financial performance. As shown in tables (1), (2), (3), and (4), respondents were asked to answer a four section questionnaire, each measuring a hypothesis from the four research hypotheses. Respondents were provided with a list of questions that might be driving or impeding the use of Big Data Analytics in the supply chain and how it affects financial reporting, financial decision making, and financial performance. Using a five-point ranking scale, respondents were asked to

respond to statements or questions aimed at obtaining information about these research hypotheses. The participants were asked to either agree or disagree with the survey questions using a five-point Likert scale. The possible rankings varied from 1 (strongly disagree) to 5 (strongly agree) plus a "don't know" (neutral) category. Excel and SPSS 25 were used to analyze the responses to the survey.

In the questionnaire, big data is defined as "any collection of datasets so large and complex that it becomes difficult to process using on-hand data management tools or traditional data processing applications". Big data analytics refers to the process of collecting, organizing, and analyzing large sets of data to discover patterns and other useful information for decision-making.

7. Statistical Results and Discussion

7.1 Reliability Test

Table (1) shows the reliability test conducted for the questionnaire questions using all available data, and the reliability coefficient takes values ranging from zero to one. The correct value is one. That is, increasing the value of the reliability coefficient means increasing the credibility of the data by reflecting the results of the sample on the study population. It is also possible to calculate the validity coefficient (validity) by calculating the root of the reliability coefficient.

From table (1), it is concluded that:

1. For the first hypothesis **(Big data analytics has a significant positive role in the supply chain),** the value of Cronbach's Alpha is 0.613, which is a good percentage, and the number of elements is 15. The validity coefficient is 0.783.
2. For the second hypothesis (**the use of Big accounting data analytics in supply chain leads to improving the efficiency of financial reporting**), the value of

Cronbach's Alpha is 0.598, which is a good percentage, and the number of elements is 7. The validity coefficient is 0.773.

3. For the third hypothesis (**using big accounting data analytics in supply chain leads to better financial decision-making by managers**), the value of Cronbach's Alpha is 0.587, which is a good percentage, and the number of elements is 12. The validity coefficient is 0.766.
4. For the fourth hypothesis **(the use of Big accounting data analytics in supply chain can enhance financial performance**), the value of Cronbach's Alpha is 0.797, which is a good percentage, and the number of elements is 22. The validity coefficient is 0.893.

Table (5): Reliability Statistics

Hypotheses	Cronbach's Alpha	N of Items
First Hypothesis	0.613	15
Second Hypothesis	0.598	7
Third Hypothesis	0.587	12
Fourth Hypothesis	0.797	22

7.2 Frequency Test

Frequency analysis, a descriptive statistical technique, displays the frequency of each response selected by the respondents. SPSS Statistics can determine the mean, median, and mode when performing frequency analysis to assist users in analyzing and drawing conclusions. The number of times each variable, such as the number of males and females in the sample, occurs is simply counted in frequency statistics. Measures of central tendency, such as the mean, produce a single value that represents the whole set of scores.

Tables (2), (3), (4), and (5) list the questionnaire items as well as the type of psychometric response scale used, which asks respondents to rate their level of agreement with a statement on

a five-point scale: (1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree.

Table (2) presents the questionnaire questions used to measure the first hypothesis: The Role of BDA in the Supply Chain.

Table (2): Survey Section 1: Hypothesis 1 - The Role of BDA in Supply Chain

First Hypothesis	Valid					Total	Missing	Total
	Strongly Disagree	Disagree	Don't Know (Neutral)	Agree	Strongly Agree		System	
1. Big data is important for supply chain management in the following areas:								
1.1 Planning and decision making								
Frequency	3	9	9	29	25	75	6	81
Percent	3.7	11.1	11.1	35.8	30.9	92.6	7.4	100
1.2 Monitoring and performance measurement								
Frequency	7	9	16	36	75	6	81	7
Percent	8.6	11.1	19.8	44.4	92.6	7.4	100	8.6
1.3 Sales and marketing								
Frequency	5	12	7	18	33	75	6	81
Percent	6.2	14.8	8.6	22.2	40.7	92.6	7.4	100
1.4 Managing risk								
Frequency	1	7	5	26	36	75	6	81
Percent	1.2	8.6	6.2	32.1	44.4	92.6	7.4	100
1.5 Improve process and operation efficiency								
Frequency	5	9	6	19	36	75	6	81
Percent	6.2	11.1	7.4	23.5	44.4	92.6	7.4	100
1.6 Optimal resources allocation								
Frequency	2	12	6	19	36	75	6	81
Percent	2.5	14.8	7.4	23.5	44.4	92.6	7.4	100
1.7 Making product / services development or production decision								
Frequency	1	6	12	29	27	75	6	81
Percent	1.2	7.4	14.8	35.8	33.3	92.6	7.4	100
1.8 Making logistics / distribution channel decisions								
Frequency	7	8	9	18	33	75	6	81
Percent	8.6	9.9	11.1	22.2	40.7	92.6	7.4	100

1.9 Making capital budgeting for investment decisions								
Frequency	5	14	5	15	36	75	6	81
Percent	6.2	17.3	6.2	18.5	44.4	92.6	7.4	100
1.10 Forecasting, budgeting and annual planning								
Frequency	3	10	8	19	35	75	6	81
Percent	3.7	12.3	9.9	23.5	43.2	92.6	7.4	100
2. The role of BDA in supply chain								
1.1 Improving predictions on customer needs								
Frequency	5	7	7	16	40	75	6	81
Percent	6.2	8.6	8.6	19.8	49.4	92.6	7.4	100
1.2 Improving efficiency of supply chain								
Frequency	3	8	6	24	34	75	6	81
Percent	3.7	9.9	7.4	29.6	42	92.6	7.4	100
1.3 Improving risk assessment in supply chain								
Frequency	4	5	4	25	37	75	6	81
Percent	4.9	6.2	4.9	30.9	45.7	92.6	7.4	100
1.4 Improving traceability in supply chain								
Frequency	5	11	5	18	36	75	6	81
Percent	6.2	13.6	6.2	22.2	44.4	92.6	7.4	100
1.5 Improving the reaction time								
Frequency	3	8	5	22	37	75	6	81
Percent	3.7	9.9	6.2	27.2	45.7	92.6	7.4	100

Table (3), presents the questionnaire questions used to measure the second hypothesis: The Role of BDA in Supply Chain – financial reporting.

Table (3): Survey Section 2: Hypothesis 2 - The Role of BDA in Supply Chain: Financial Reporting

Second Hypothesis	Valid					Total	Missing	Total
	Strongly Disagree	Disagree	Don't Know (Neutral)	Agree	Strongly Agree		System	
1. Do you use Big Data (financial, non-financial; structured, unstructured; internal, external data) when performing financial reporting?								
Frequency	4	7	30	34	75	6	81	81
Percent	4.9	8.6	37	42	92.6	7.4	100	100
2. Do you think that financial accounting standards becoming outdated in this emerging Big Data environment and need to be modified to encourage financial accountants to use more Big Data analytics?								
Frequency	4	5	9	23	34	75	6	81
Percent	4.9	6.2	11.1	28.4	42	92.6	7.4	100
3. Big data is important in financial accounting reporting and financial information for management.								
Frequency	2	5	7	32	29	75	6	81
Percent	2.5	6.2	8.6	39.5	35.8	92.6	7.4	100
4. users directly access external data using specialized online query and financial reporting.								
Frequency	٠	5	10	30	30	75	6	81
Percent	٠	6.2	12.3	37	37	92.6	7.4	100
5. End users directly access internal data through online query and financial reporting tools.								
Frequency	4	5	10	21	35	75	6	81
Percent	4.9	6.2	12.3	25.9	43.2	92.6	7.4	100
6. Requests are made to data analysts who use internal and external data sources to provide necessary financial information.								
Frequency	3	8	4	25	35	75	6	81
Percent	3.7	9.9	4.9	30.9	43.2	92.6	7.4	100
7. Regular reports provide the base financial data required to guide financial decisions.								
Frequency	2	5	7	31	30	75	6	81
Percent	2.5	6.2	8.6	38.3	37	92.6	7.4	100

Table (4), presents the questionnaire questions used to measure the third hypothesis: The Role of BDA in Supply Chain – financial decision making.

Table (4): Survey Section 3: Hypothesis 3 - The Role of BDA in Supply Chain: Financial Decision Making

Third Hypothesis	Valid					Total	Missing	Total
	Strongly Disagree	Disagree	Don't Know (Neutral)	Agree	Strongly Agree		System	
1. Big Data used from a variety of structured internal and external sources to support financial decision making.								
Frequency	5	7	4	24	35	75	6	81
Percent	6.2	8.6	4.9	29.6	43.2	92.6	7.4	100
2. Big Data used from a variety of unstructured internal and external sources to support financial decision making.								
Frequency	4	9	5	21	36	75	6	81
Percent	4.9	11.1	6.2	25.9	44.4	92.6	7.4	100
3. Big data applications in financial decision making provide timely and accurate information to facilitate efforts to control costs.								
Frequency	4	5	4	24	38	75	6	81
Percent	4.9	6.2	4.9	29.6	46.9	92.6	7.4	100
4. Using Big data technologies and tools in relation to management and financial information will provide integrated information for management and decision making.								
Frequency	٠	5	6	29	35	75	6	81
Percent	٠	6.2	7.4	35.8	43.2	92.6	7.4	100
5. Using Big data provide better/more informed financial decision making.								
Frequency	5	7	5	23	35	75	6	81
Percent	6.2	8.6	6.2	28.4	43.2	92.6	7.4	100
6. Using Big data improve quality of decision making.								
Frequency	5	8	4	23	35	75	6	81
Percent	6.2	9.9	4.9	28.4	43.2	92.6	7.4	100
7. Using Big data improve data accuracy and integrity.								
Frequency	٠	8	4	27	36	75	6	81
Percent	٠	9.9	4.9	33.3	44.4	92.6	7.4	100
8. Using Big data improve performance measures.								
Frequency	4	9	5	20	37	75	6	81
Percent	4.9	11.1	6.2	24.7	45.7	92.6	7.4	100
9. Using Big data provide access to real time data.								
Frequency	3	9	3	24	36	75	6	81
Percent	3.7	11.1	3.7	29.6	44.4	92.6	7.4	100

10. Using Big data provide insight into trends.								
Frequency	٠	4	10	33	28	75	6	81
Percent	٠	4.9	12.3	40.7	34.6	92.6	7.4	100
11. Using Big data increase customer awareness.								
Frequency	5	5	7	27	31	75	6	81
Percent	6.2	6.2	8.6	33.3	38.3	92.6	7.4	100
12. Using Big data improve marketing and sales information.								
Frequency	3	5	8	27	32	75	6	81
Percent	3.7	6.2	9.9	33.3	39.5	92.6	7.4	100

Table (5), presents the questionnaire questions used to measure the fourth hypothesis: The Role of BDA in Supply Chain – financial performance.

Table (5): Survey Section 4: Hypothesis 4 - The Role of BDA in Supply Chain: Financial Performance

Fourth Hypothesis	Valid					Total	Missing	Total
	Strongly Disagree	Disagree	Don't Know (Neutral)	Agree	Strongly Agree		System	
1. Using Big Data lead to better management of supply chain financial risk and financial performance.								
Frequency	4	4	8	26	33	75	6	81
Percent	4.9	4.9	9.9	32.1	40.7	92.6	7.4	100
2. Using Big Data lead to improvement in supply chain costs.								
Frequency	1	6	7	29	32	75	6	81
Percent	1.2	7.4	8.6	35.8	39.5	92.6	7.4	100
3. Using Big Data enhanced bargaining position in negotiations with suppliers								
Frequency	2	5	6	30	32	75	6	81
Percent	2.5	6.2	7.4	37	39.5	92.6	7.4	100
4. Using Big Data enhance improvement in supply chain efficiencies.								
Frequency	3	6	7	25	34	75	6	81
Percent	3.7	7.4	8.6	30.9	42	92.6	7.4	100
5. Using Big Data enhanced demand planning capabilities.								
Frequency	1	3	4	31	36	75	6	81
Percent	1.2	3.7	4.9	38.3	44.4	92.6	7.4	100
6. Using Big Data enhanced sales and operations planning.								
Frequency	2	4	5	32	32	75	6	81
Percent	2.5	4.9	6.2	39.5	39.5	92.6	7.4	100

7. Using Big Data enhanced bargaining position in negotiations with customers.								
Frequency	2	3	4	29	37	75	6	81
Percent	2.5	3.7	4.9	35.8	45.7	92.6	7.4	100
8. Using Big Data enable to respond faster to changing environments.								
Frequency	2	5	6	30	32	75	6	81
Percent	2.5	6.2	7.4	37	39.5	92.6	7.4	100
9. Using Big Data enable real-time decision-making capability.								
Frequency	٠	1	6	42	26	75	6	81
Percent	٠	1.2	7.4	51.9	32.1	92.6	7.4	100
10. Using Big Data provide greater power in relationships with suppliers.								
Frequency	2	4	8	34	27	75	6	81
Percent	2.5	4.9	9.9	42	33.3	92.6	7.4	100
11. Using Big Data provide greater power in relationships with customers.								
Frequency	2	4	6	35	28	75	6	81
Percent	2.5	4.9	7.4	43.2	34.6	92.6	7.4	100
12. Business processes and Big Data analytics are essential to the financial performance and competitive advantage of a modern corporation.								
Frequency	٠	2	4	40	29	75	6	81
Percent	٠	2.5	4.9	49.4	35.8	92.6	7.4	100
13. Big Data used adequate analysis tools to examine supply chain financial performance.								
Frequency	2	2	3	37	31	75	6	81
Percent	2.5	2.5	3.7	45.7	38.3	92.6	7.4	100
14. Big Data analyze the variability of demand for your products.								
Frequency	1	5	4	37	28	75	6	81
Percent	1.2	6.2	4.9	45.7	34.6	92.6	7.4	100
15. Big Data use mathematical methods (statistics) for forecasting demand.								
Frequency	2	5	9	32	27	75	6	81
Percent	2.5	6.2	11.1	39.5	33.3	92.6	7.4	100
16. BD used to improve, enhance and measure productivity.								
Frequency	1	6	4	35	29	75	6	81
Percent	1.2	7.4	4.9	43.2	35.8	92.6	7.4	100
17. Big Data used to improve production processes.								
Frequency	4	5	7	30	29	75	6	81
Percent	4.9	6.2	8.6	37	35.8	92.6	7.4	100
18. Big Data used to report accurate product costs so that pricing decisions.								
Frequency	2	5	7	32	29	75	6	81
Percent	2.5	6.2	8.6	39.5	35.8	92.6	7.4	100

19. Big Data help in the introduction of new products, abandonment of obsolete products.								
Frequency	٠	5	7	38	25	75	6	81
Percent	٠	6.2	8.6	46.9	30.9	92.6	7.4	100
20. Big data analyses will have a significant impact on supply chain financial performance in terms of customer segmentation to improve focus and increase revenues.								
Frequency	4	5	7	27	32	75	6	81
Percent	4.9	6.2	8.6	33.3	39.5	92.6	7.4	100
21. Big data analyses will have a significant impact on supply chain financial performance in terms of improved process efficiency and product quality.								
Frequency	2	5	11	33	24	75	6	81
Percent	2.5	6.2	13.6	40.7	29.6	92.6	7.4	100
22. Big data analyses will have a significant impact on supply chain financial performance in terms of understanding customers' needs and identifying opportunities to innovate.								
Frequency	1	4	5	33	32	75	6	81
Percent	1.2	4.9	6.2	40.7	39.5	92.6	7.4	100

7.3 Descriptive Statistics

Tables (6), (7), (8), and (9) show the descriptive statistics for the four research hypotheses. Figures (3), (4), (5), and (6) present averages (mean) of responses to questions for each research hypothesis.

7.3.1 Hypothesis 1: The Role of BDA in Supply Chain

From table (6) and figure (3), it is concluded that:

1. Combining cutting-edge analytics and Big Data can dramatically increase both technologies' capacity to provide value to an organization, allowing organizations to obtain a better understanding of their operations and improve forecasting. Organizations who do not want to fall behind their competitors must devote sufficient resources to the implementation of advanced analytic tools and Big Data.
2. Participating organizations have not all benefited equally from their usage of big data analytics, just as adoption of a

big data analytics methodology differed across our survey. According to several respondents in our questionnaire, it has helped them improve customer service and demand fulfillment, experience faster and more effective response time to supply chain challenges, raise supply chain efficiency, and drive more supply chain integration.

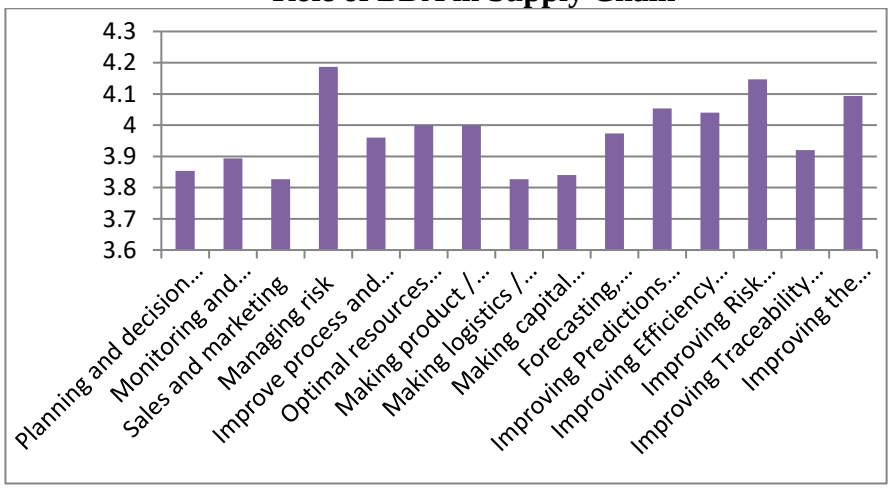
3. **Here are some examples of how Big Data analytics could be used in various sectors of the supply chain:**
    - **Planning**: assessing data to forecast product and service market trends; until recently, marketing and finance departments would commonly conduct this in the form of monthly and yearly reports.
    - **Sourcing**: improving supplier selection, price negotiation, and supplier evaluation by using an agent-based procurement system with a procurement model, search, negotiation, and evaluation agents.
    - **Making**: ensuring that each inventory item is produced correctly, not only in terms of time, but also in terms of each production belt and batch.
    - **Delivering**: a variety of applications of BA in logistics management have been established in order to more efficiently bring products to market.

Table (6) shows that the means for each response to questions 1–15 range between 3.8267 (S.D. = 1.32923) and 4.1867 (S.D. = 1.00933). The grand mean of 4.1867 is an above-average grand mean (agree). This indicates the moderate positive perception of Egyptian companies of the benefits derived from big data and data analytics in supply chain.

Table (6): Descriptive Statistics: Hypothesis 1 - The Role of BDA in Supply Chain

Item	N	Min.	Max.	Mean	Std. Deviation	Decision
Planning and decision making	75	1.00	5.00	3.8533	1.13535	Agree
Monitoring and performance measurement	75	1.00	5.00	3.8933	1.35141	Agree
Sales and marketing	75	1.00	5.00	3.8267	1.32923	Agree
Managing risk	75	1.00	5.00	4.1867	1.00933	Agree
Improve process and operation efficiency	75	1.00	5.00	3.9600	1.28862	Agree
Optimal resources allocation	75	1.00	5.00	4.0000	1.20808	Agree
Making product / services development or production decision	75	1.00	5.00	4.0000	.98639	Agree
Making logistics / distribution channel decisions	75	1.00	5.00	3.8267	1.34941	Agree
Making capital budgeting for investment decisions	75	1.00	5.00	3.8400	1.37585	Agree
Forecasting, budgeting and annual planning	75	1.00	5.00	3.9733	1.21892	Agree
Improving Predictions on Customer Needs	75	1.00	5.00	4.0533	1.27230	Agree
Improving Efficiency of Supply Chain	75	1.00	5.00	4.0400	1.15595	Agree
Improving Risk Assessment in Supply Chain	75	1.00	5.00	4.1467	1.13535	Agree
Improving Traceability in Supply Chain	75	1.00	5.00	3.9200	1.32298	Agree
Improving the Reaction Time	75	1.00	5.00	4.0933	1.16449	Agree
Valid N (listwise)	75					

Figure (3): Descriptive Statistics (Mean): Hypothesis 1 - The Role of BDA in Supply Chain



7.3.2 Hypothesis 2: The Role of BDA in Supply Chain: Financial Reporting

From table (7) and figure (4), it is concluded that:

1. Big Data refers to the collection and analysis of large amounts of digital data in order to generate business intelligence. Data sets that are too massive and complicated for typical data processing and data management tools are referred to as big data. Businesses are turning to the cloud to store, manage, and analyze their big data as data sets grow and apps produce more real-time, streaming data.
2. Big Data is defined as a tremendous increase in the amount of data that is currently being used to get new insights into corporate performance, opportunities, and risks. Financial data, enterprise-wide data, and new sorts of internal and external data, some of which is unstructured, make up Big Data.
3. A lot of the data that organizations collect, report, and use are presented in financial statements. Even as it becomes more important to report other, non-financial information that stakeholders find relevant to their decision-making, financial statements prepared in accordance with internationally accepted financial reporting standards are a critical instrument for the effective functioning of markets. Given the importance of financial statements, finding measures to improve their quality and understanding their purpose and limitations in providing a complete picture of an entity's financial status is essential.
4. The role of the auditor has been emphasized in government and regulatory responses to the current global financial crisis and company failures. A slew of legislative reforms have impacted the auditing profession, and financial reporting standard setting has been a contentious issue. However, the roles of management teams and boards of directors, as well as the obligations and effects of regulators, in attaining high-quality financial reporting, have received far less attention.

A more holistic view of financial reporting is necessary, one that recognizes, evaluates, and investigates the entire financial reporting supply chain—that is, all of the people and processes involved in the development, approval, audit, analysis, and usage of financial reports.

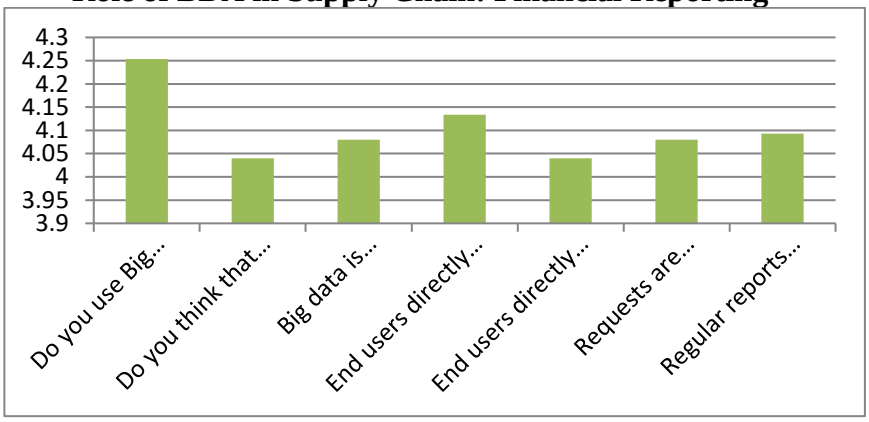
5. Financial reporting is critical to capital markets, economic stability, and growth; hence attempts to improve its quality are critical. However, because it is a complicated process with several components, connections, and actors, only a comprehensive, critical examination of the full financial reporting supply chain can be effective. All components of the supply chain, as well as the roles and duties that all parties have in achieving even greater outcomes, must be discussed, debated, and decided upon.

Table (7) shows that the means for each response to questions 1–7 range between 4.0400 (S.D. = 1.15595) and 4.2533 (S.D. = .83978). The grand mean of 4.2533 is an above-average grand mean (strongly agree). This indicates the moderate positive perception of Egyptian companies of the role of big data and data analytics in supply chain related to financial reporting.

Table (7): Descriptive Statistics: Hypothesis 2 - The Role of BDA in Supply Chain: Financial Reporting

Item	N	Min.	Max.	Mean	Std. Deviation	Decision
Do you use Big Data (financial, non-financial; structured, unstructured; internal, external data) when performing financial reporting?	75	2.00	5.00	4.2533	.83978	Strongly Agree
Do you think that financial accounting standards becoming outdated in this emerging Big Data environment and need to be modified to encourage financial accountants to use more Big Data analytics?	75	1.00	5.00	4.0400	1.15595	Agree
Big data is important in financial accounting reporting and financial information for management.	75	1.00	5.00	4.0800	.99675	Agree
End users directly access external data using specialized online query and financial reporting.	75	2.00	5.00	4.1333	.89039	Agree
End users directly access internal data through online query and financial reporting tools.	75	1.00	5.00	4.0400	1.16758	Agree
Requests are made to data analysts who use internal and external data sources to provide necessary financial information.	75	1.00	5.00	4.0800	1.14797	Agree
Regular reports provide the base financial data required to guide financial decisions.	75	1.00	5.00	4.0933	1.00234	Agree
Valid N (listwise)	75					

Figure (4): Descriptive Statistics (Mean): Hypothesis 2 - The Role of BDA in Supply Chain: Financial Reporting



7.3.3 Hypothesis 3: The Role of BDA in Supply Chain: Financial Decision Making

From table (8) and figure (5), it is concluded that:

1. While most firms are still using Big Data methodologies, benefits in important areas like performance assessment and strategy formulation have already been realized. They're using Big Data in other organizational processes as well, based on their early successes, with more applications to come.
2. Finance has a unique position in the organization because it has a comprehensive perspective of the business and can comprehend the controls and processes in place. Finance will be able to use its unique vision of the business by taking on a more strategic role as new technologies free up resources, allowing it to move up and down the supply chain.
3. Finance professionals have a big opportunity to support the business-critical use of data. They can collaborate with other company areas to provide more effective planning and decision-making support. They can do research to assist

corporate functions in comprehending the financial ramifications of their operations or objectives. They can assist business departments in improving the quality of data used to make financial decisions. To support these operations, Big Data presents opportunity for enhanced analysis and new insights.

4. Financial data consists of typical financial measures, whereas enterprise data consists of financial data as well as broader operational and transactional data that can help with analysis and forecasting. Big Data encompasses company data as well as new types of internal and external data; most of it is unstructured but could provide new business insights.
5. Any company generates a lot of data. Structured data is information that is kept within a corporation and is used to make key decisions. Unstructured data is accumulating in ever-increasing numbers from a variety of sources, presenting significant analytical opportunities.
6. Any organization's ability to perform effectively is dependent on timely and relevant information. External stakeholders—investors, suppliers, creditors, banks, and regulators—use financial and non-financial data to manage and direct their operations, while internal stakeholders—investors, suppliers, creditors, banks, and regulators—use it to make investment decisions, conduct transactions with confidence, and exercise regulatory oversight.
7. Big data and business analytics are already influencing practically every area of big firms' financial decision-making, strategic analysis, and forecasting by using Big Data to provide more specialized financial decision-making support in real time. One of the most significant advantages of big data is the ability to make smarter financial decisions. According to a survey, the majority of businesses agree or strongly agree that implementing big data initiatives has improved financial decision-making, and businesses increasingly appear to be using data to inform discussions

about developing new products and services, as well as how to interact with customers, employees, and stakeholders.

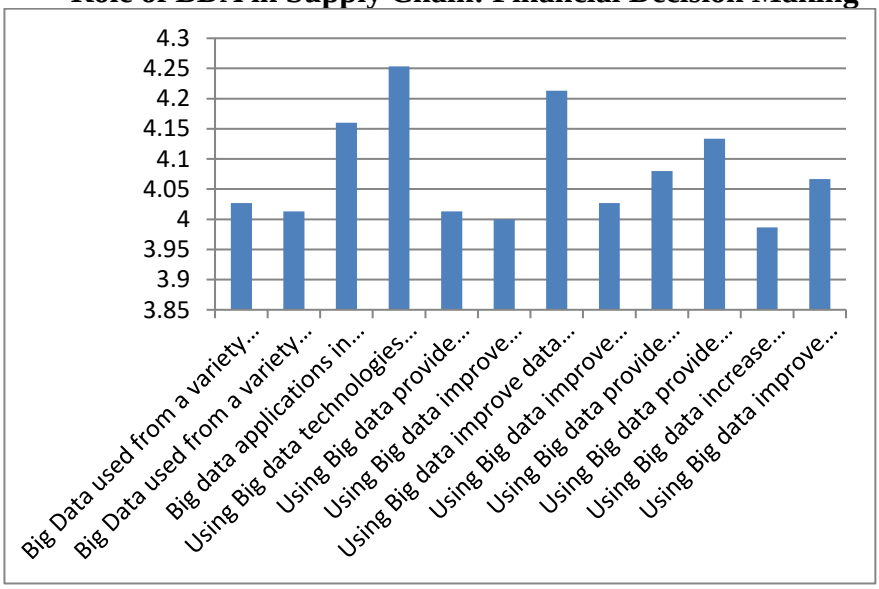
Table (8) shows that the means for each response to questions 1–12 range between 3.9867 (S.D. = 1.17971) and 4.2133 (S.D. = .96273). The grand mean of 4.2133 is an above-average grand mean (strongly agree). This indicates the moderate positive perception of Egyptian companies of the role of big data and data analytics in supply chain related to financial decision making.

Table (8): Descriptive Statistics: Hypothesis 3 - The Role of BDA in Supply Chain: Financial Decision Making

Item	N	Min.	Max.	Mean	Std. Deviation	Decision
Big Data used from a variety of structured internal and external sources to support financial decision making.	75	1.00	5.00	4.0267	1.22996	Agree
Big Data used from a variety of unstructured internal and external sources to support financial decision making.	75	1.00	5.00	4.0133	1.23566	Agree
Big data applications in financial decision making provide timely and accurate information to facilitate efforts to control costs.	75	1.00	5.00	4.1600	1.13946	Agree
Using Big data technologies and tools in relation to management and financial information will provide integrated information for management and decision making.	75	2.00	5.00	4.2533	.87137	Strongly Agree
Using Big data provide better/more informed financial decision making.	75	1.00	5.00	4.0133	1.23566	Agree

Using Big data improve quality of decision making.	75	1.00	5.00	4.0000	1.25203	Agree
Using Big data improve data accuracy and integrity.	75	2.00	5.00	4.2133	.96273	Strongly Agree
Using Big data improve performance measures.	75	1.00	5.00	4.0267	1.24089	Agree
Using Big data provide access to real time data.	75	1.00	5.00	4.0800	1.17128	Agree
Using Big data provide insight into trends.	75	2.00	5.00	4.1333	.84363	Agree
Using Big data increase customer awareness.	75	1.00	5.00	3.9867	1.17971	Agree
Using Big data improve marketing and sales information.	75	1.00	5.00	4.0667	1.08221	Agree
Valid N (listwise)	75					

Figure (5): Descriptive Statistics (Mean): Hypothesis 3 - The Role of BDA in Supply Chain: Financial Decision Making



7.3.4 Hypothesis 4: The Role of BDA in Supply Chain: Financial Performance

From table (9) and figure (6), it is concluded that:

1. While the number of survey respondents that have previously deployed Big Data techniques is small, the impact is obvious: The vast majority of businesses say their financial performance has improved, while the remaining businesses say it's too early to determine if any benefits have been realized.
2. The findings suggest that Big Data can be used to improve financial performance across an organization; however, its potential impact on performance assessment is greater. It is used to evaluate the performance of personnel, processes, machinery, and other items objectively.
3. Data is becoming more important to supply chain managers in order to get visibility into expenditures, identify cost and performance patterns, and assist process control, inventory monitoring, production optimization, and process improvement efforts. With fact, many organizations are flooded in data; with many attempting to gain a competitive advantage through data analysis (Hazen et al., 2014).
4. BA is becoming more popular in supply chain management (SCM). SC performance improvement has evolved into a continuous process that necessitates the use of an analytical performance measurement system. Furthermore, the usage of BA benefits a knowledge company by increasing efficiency inside an organization, notably by utilizing analytical tools to provide vital decision-making expertise in order to reduce operating expenses and accurately forecast market trends. Companies with more advanced SC practices, such as increased BA skills, are able to reduce costs more quickly and achieve higher profit margins than their less mature counterparts. Furthermore, higher degrees of SCM practice, such as a higher level and quality of information sharing, can lead to a stronger competitive advantage and better results.

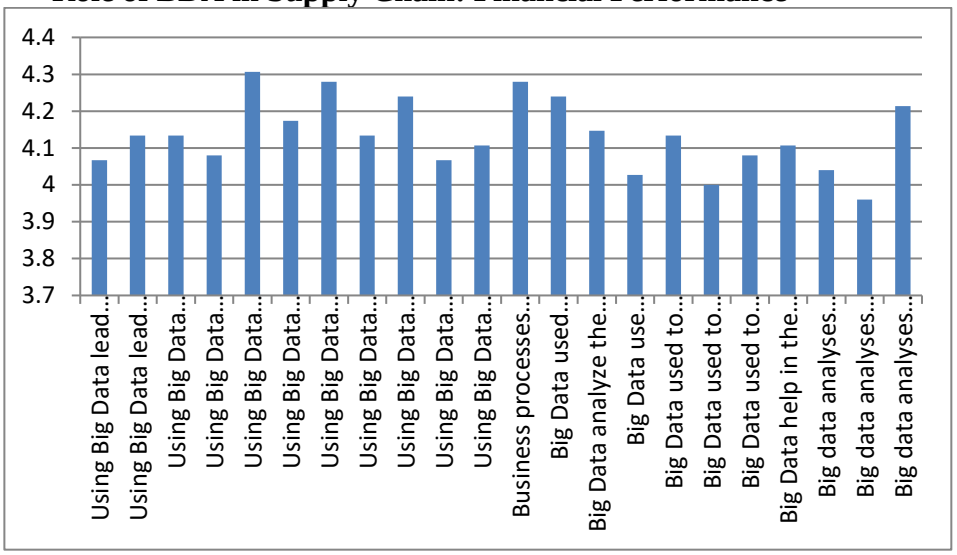
Table (9) shows that the means for each response to questions 1–٢2 range between 3.9600 (S.D. = .99240) and 4.3067 (S.D. = .85382). The grand mean of 4.3067 is an above-average grand mean (strongly agree). This indicates the moderate positive perception of Egyptian companies of the role of big data and data analytics in supply chain related to financial performance.

Table (9): Descriptive Statistics: Hypothesis 4 - The Role of BDA in Supply Chain: Financial Performance

Item	N	Min.	Max.	Mean	Std. Deviation	Decision
Using Big Data lead to better management of supply chain financial risk and financial performance.	75	1.00	5.00	4.0667	1.11904	Agree
Using Big Data lead to improvement in supply chain costs.	75	1.00	5.00	4.1333	.97722	Agree
Using Big Data enhanced bargaining position in negotiations with suppliers	75	1.00	5.00	4.1333	1.00449	Agree
Using Big Data enhance improvement in supply chain efficiencies.	75	1.00	5.00	4.0800	1.11210	Agree
Using Big Data enhanced demand planning capabilities.	75	1.00	5.00	4.3067	.85382	Strongly Agree
Using Big Data enhanced sales and operations planning.	75	1.00	5.00	4.1733	.96385	Agree
Using Big Data enhanced bargaining position in negotiations with customers.	75	1.00	5.00	4.2800	.93808	Strongly Agree
Using Big Data enable to respond faster to changing environments.	75	1.00	5.00	4.1333	1.00449	Agree
Using Big Data enable real-time decision-making capability.	75	2.00	5.00	4.2400	.65430	Strongly Agree
Using Big Data provide greater power in relationships with suppliers.	75	1.00	5.00	4.0667	.96329	Agree
Using Big Data provide greater power in relationships with customers.	75	1.00	5.00	4.1067	.95257	Agree

Business processes and Big Data analytics are essential to the financial performance and competitive advantage of a modern corporation.	75	2.00	5.00	4.2800	.68891	Strongly Agree
Big Data used adequate analysis tools to examine supply chain financial performance.	75	1.00	5.00	4.2400	.86743	Strongly Agree
Big Data analyze the variability of demand for your products.	75	1.00	5.00	4.1467	.89584	Agree
Big Data use mathematical methods (statistics) for forecasting demand.	75	1.00	5.00	4.0267	.99964	Agree
BD used to improve, enhance and measure productivity.	75	1.00	5.00	4.1333	.93481	Agree
Big Data used to improve production processes.	75	1.00	5.00	4.0000	1.11501	Agree
Big Data used to report accurate product costs so that pricing decisions.	75	1.00	5.00	4.0800	.99675	Agree
Big Data help in the introduction of new products, abandonment of obsolete products.	75	2.00	5.00	4.1067	.83137	Agree
Big data analyses will have a significant impact on supply chain financial performance in terms of customer segmentation to improve focus and increase revenues.	75	1.00	5.00	4.0400	1.13233	Agree
Big data analyses will have a significant impact on supply chain financial performance in terms of improved process efficiency and product quality.	75	1.00	5.00	3.9600	.99240	Agree
Big data analyses will have a significant impact on supply chain financial performance in terms of understanding customers' needs and identifying opportunities to innovate.	75	1.00	5.00	4.2133	.88978	Strongly Agree
Valid N (listwise)	75					

Figure (6): Descriptive Statistics (Mean): Hypothesis 4 - The Role of BDA in Supply Chain: Financial Performance



Conclusion

Big Data analytics will ensure that important information is available in a timely manner, allowing businesses to make better decisions. Better/more targeted marketing activities, improved business decision making, cost reduction and generation of operational efficiencies, enhanced planning and strategic decision making, increased business agility, risk analysis and fraud detection, waste reduction, and customer retention are some of the potential benefits of using Big Data in business.

Big Data presents a plethora of possibilities. These include, for example, the availability of real-time data or increased financial decision-making support, as well as financial performance, since improved transparency and visibility provided by big data may minimize supply chain risk. To address the question of how data may assist in driving supply chain results, the supply chain must develop close and continuous relationships between data professionals and their business functions, as well as employ BDA approaches in the

context of their application in their decision making, processes, and activities. As a result, diverse supply chain units must create mutual coordination and collaboration, with BDA approaches being utilized to connect these units and increase the capacity to share and access data and information throughout the supply chain.

Supply chain partners must use advances in Big Data analytics to deliver more information to consumers, stakeholders, governments, and any other interested parties, as it allows accountants and finance experts to provide higher-quality services to their business clients in three areas: a broader and deeper perspective on the business's financial decision making, more accurate predictions of future market and industry trends (financial performance) and automation of routine tasks to improve accounting accuracy and reduce costs (financial reporting).

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