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Data analysis in business management

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Abstract:

Information, expertise, and data have always been essential to successful organizations. As the variety and volume of data that may be collected and stored grow, businesses will require improved processing and analysis methods. Thoughts on Big Data are presented in this paper. This paper focuses on how Big Data analytics may be a valuable tool for business management. It also highlights the functions and tasks where Big Data analytics might be most helpful to businesses.

Keywords: Data, analysis, business management, Saudi Arabia.

الملخص.

لطالما كانت المعلومات والخبرة والبيانات ضرورية لإدارة مؤسسة ناجحة. نظرًا لتنوع وحجم البيانات التي يمكن جمعها وتخزينها، ستحتاج الشركات إلى طرق محسّنة لمعالجة هذه المعلومات وتحليلها. يتم عرض الأفكار حول البيانات الضخمة في هذه الورقة. تركز هذه الورقة على إظهار كيف يمكن أن تكون تحليلات البيانات الضخمة أداة مفيدة لإدارة الأعمال. كما يسلط الضوء على الوظائف والمهام التي قد تكون فيها تحليلات البيانات الضخمة مفيدة للغاية للشركات.

الكلمات المفتاحية : البيانات ، التحليل ، إدارة الأعمال ، السعودية .

Introduction:

Both the information systems (IS) academic community and business practitioners have paid close attention to how data analytics (DA) might improve company performance. Analyses of how data analytics can benefit a company's bottom line have been conducted for some time. When it comes to enhancing decision-making, "analytics and decision automation are among the most powerful tools," as Davenport (2009) stated. Strategically and tactically, more and more businesses are embracing the former, centering their competitive strategies on their analytical capabilities and basing their judgments on data and analytics. In a survey of over 2,500 business leaders, Kiron et al. (2012) found that 67% of respondents said: "using analytics has created at least a moderate competitive advantage for them ."Business analytics (BA) is a more general

term for using analytical methods in commercial settings. Researchers have recently examined the effects of big data analytics (BDA) on business results. The "application of statistical, processing, and analytics techniques to big data for advancing business" is how Grover et al. (2018) defined BDA.

From government and e-commerce to health and sports organizations, "Big Data" has silently taken over several fields over the past decade. (Beyer, M., 2011)

The Internet, electronic commerce, electronic mail, audio, video, image, click stream, log, post, query, health records, social media, scientific data, mobile phones, and their applications all contribute to this data.

By the end of the next decade, there will be 50 times as much data as ten years ago and only 1.5 times as many information technology experts to manage it. (Jelonek, D.,2017)

In the context of Big Data, information overload is a significant issue. It is increasingly challenging for information consumers to accurately search the large amounts of information to find what they need. Companies can get a lot of insight from data collection, processing, and analysis if they have the resources to handle massive datasets. As the volume of available business data expands exponentially, faster data access is becoming increasingly important.

The ability to transform raw data into usable information and intelligence increasingly depends on enterprise database systems, search engines, advanced data, text, and Web analytics. As the data amount is vast, we need highly efficient analysis methods and tools.

Knowledgeable leaders with solid analytical abilities are increasingly valuable in today's business environment.

Deciding on this kind of atmosphere is risky because of the constant upheaval, and it can be much worse if you can't get your hands on the information and analysis you need when you need it. For businesses to grow, cutting-edge analytical tools and novel approaches to handling Big Data are required. Businesses whose decisions are grounded in data and analytics systems are more productive. Adopting a "data-driven decision-making approach (DDD)" is made more accessible by relying on information gleaned from analytical methods. (Kraska, T., 2013)

Research aims:

This study aims to prove that Big Data analytics is a helpful tool for corporate management. The following paragraphs will describe what Big Data is, how it differs from conventional data analysis techniques, and why and how it is used in company management. The findings of an empirical study on the importance of Big Data applications are given.

Literature review:

- **Introduction to Business Data Analytics:**

Organizations are showing much interest in business data analytics because it is seen as a way to help them gain valuable insights from data and make better business decisions. Therefore, more businesses are putting money into business data analytics to help them meet their strategic goals, create new opportunities, and gain a foothold in their industries. As a result of these expenditures, there is a greater need for experts with expertise in business data analytics.

In its broadest sense, business data analytics is the practice of applying a specific set of techniques, competencies, and procedures to the ongoing exploration and investigation of historical and real-time business data to gain insights that can inform better decision-making.

There are many angles from which to define business data analytics. (Raghupathi W. et al., 2021)

Business analytics data is only one example of the types of views covered here:

Business Data Analytics as a Movement: Evidence-based problem identification and problem-solving are central to the management ethos at the heart of the business data analytics movement. From this vantage point, data is the engine that propels organizational progress. Following this idea, all relevant evidence is considered before making business decisions rather than only that which supports a particular viewpoint or assumption.

Business Data Analytics as a Capability: Business data analytics is a competence that draws on the company's and its personnel's skills. Competency in business data analytics goes beyond the simple capacity to carry out analyses. Innovation, culture building, and process design are all a part of this set of skills. What an organization may accomplish with business data analytics may be limited by its level of capability or lack thereof.

Business Data Analytics as a Data-centric Activity Set: Evidence-based problem identification and problem solutions are two of the many tasks that comprise the corporate data analytics activity set. Expert practitioners have identified six data-centric tasks, including business data analytics: accessing, analyzing, inspecting, interpreting, aggregating, and presenting results.

Business Data Analytics as a Decision-making Paradigm: Business data analytics is a decision-making paradigm that facilitates well-considered choices. In this view, business data analytics is the instrument for problem identification and solution by applying evidence.

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Business Data Analytics as a Set of Practices and Technologies: "Business data analytics" refers to the processes and tools used to carry out analytics tasks. Five areas of business data analytics provide a helpful framework for discussing these methods: Determine Research Needs, Collect and Analyze Data, Draw Conclusions, Communicate Findings, and Impact Business Decisions. (Delen, D., et.al, 2018)

Business Data Analytics Objectives:

CEOs often make business choices based on their own knowledge and gut feelings. The decision-making process is based on analyzing large amounts of data, which can be a dangerous game if you need to know what you're doing. When appropriately executed, business data analytics can significantly benefit any company.

For instance, compared to wine experts who influence decision-making based on their own cognitive biases about what they enjoy and do not enjoy in a win, algorithms based on weather, soil, and other conditions are more accurate in predicting the price and quality of aged red wine.

The overarching goal of business data analytics is to study a company issue or opportunity systematically. The analysis type also determines the specific purposes of business data analytics. (Brock, V. F. et al., 2013)

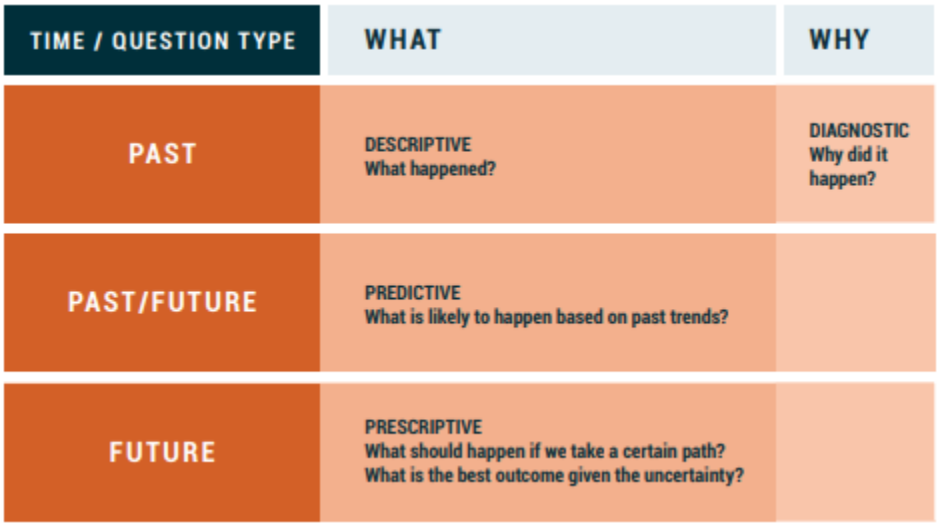
There are four distinct approaches to analytics:

Descriptive: elucidates the past by describing or summarizing information understandably. Answering "What has happened?" is the goal of descriptive analytics.

Diagnostic: inquiries into the causes of a particular result. Diagnostic analytics aims to discover the root cause of a problem or unexpected occurrence.

Predictive: predicts the future by examining patterns in historical data. To answer the question "What is likely to happen?" predictive analytics are employed.

Prescriptive: makes use of the results of several types of analytics to calculate the potential outcomes of certain decisions. Prescriptive analytics aims to guide "what ought to happen if we do...?" (Boeije, H., 2002).



Business Analysis and Business Data Analytics-

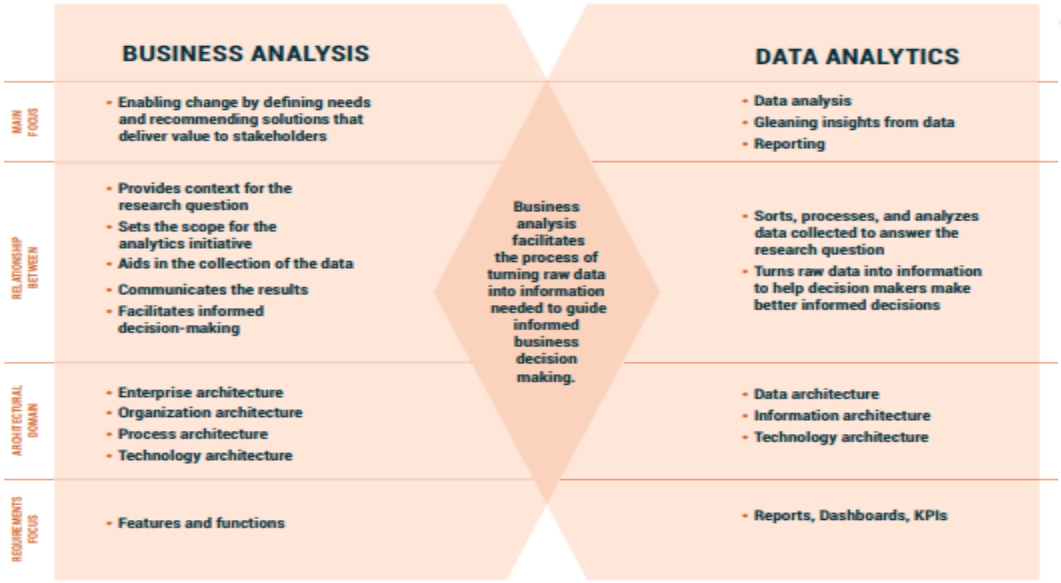
It is common practice to use the phrases "business analysis" and "business data analytics" interchangeably. However, the two names are not interchangeable and have essential distinctions. Business analysis facilitates change inside an organization by identifying pain points and proposing answers that benefit all parties involved. In contrast, corporate data analytics mainly focuses on the research itself.

Business data analytics can only be understood in the context established by business analysis. Before data collection, the scope and focus of the research questions are found through business

analysis. Data collection and the accompanying processes are other areas where business analysis is proper. It's all in a day's work regarding business data analytics.

After the data has been analyzed, business analysis tasks are carried out to make sense of the findings and advise future business decisions. Business analysis tasks are carried out to disseminate business data analytics findings and pave the way for the implementation of educated business decisions based on those findings.

Some people classify business data analytics as a subfield of business analysis because of its emphasis on numerical evaluation. This perspective is held because many of the same abilities and knowledge that are fundamental to defining business analysis are also crucial to the success of any business data analytics project. (Marr, B., 2016)



- The Business Data Analytics Cycle-

The Business Data Analytics Cycle:

The business data analytics cycle encapsulates the research components of business data analytics. A well-formed research question serves as the starting point for an iterative process that is then examined by focused, in-depth data analysis.

The scientific method serves as the foundation for the cycle. The scientific method is conducting studies to gain insight and solve problems. First, you formulate a broad research topic using the five Ws and one H (who, what, when, where, which, why, and how) to frame your inquiry. Research is conducted to answer these issues and narrow the focus of the research subject. The following is one possible question format after that:

If ____ ____ happens then will _____ happen, or

Is _____ different to _____, or

Does _____ affect _____ etc?

The method or approach is then applied to the question, and the findings are examined to generate conclusions about the more narrowly focused inquiry.

Data collection and analysis are at the heart of business analytics, whereas business analysis guides the preceding and subsequent steps of the scientific method. Guarantee the data analysis is geared toward eliciting essential questions and that the data provides meaningful insights for resolving critical business circumstances (issue or opportunity); business analysis is a prerequisite for business data analytics. (Rahul, K. et.a3, 2020)

Here is how the business analytics cycle compares to the scientific method:

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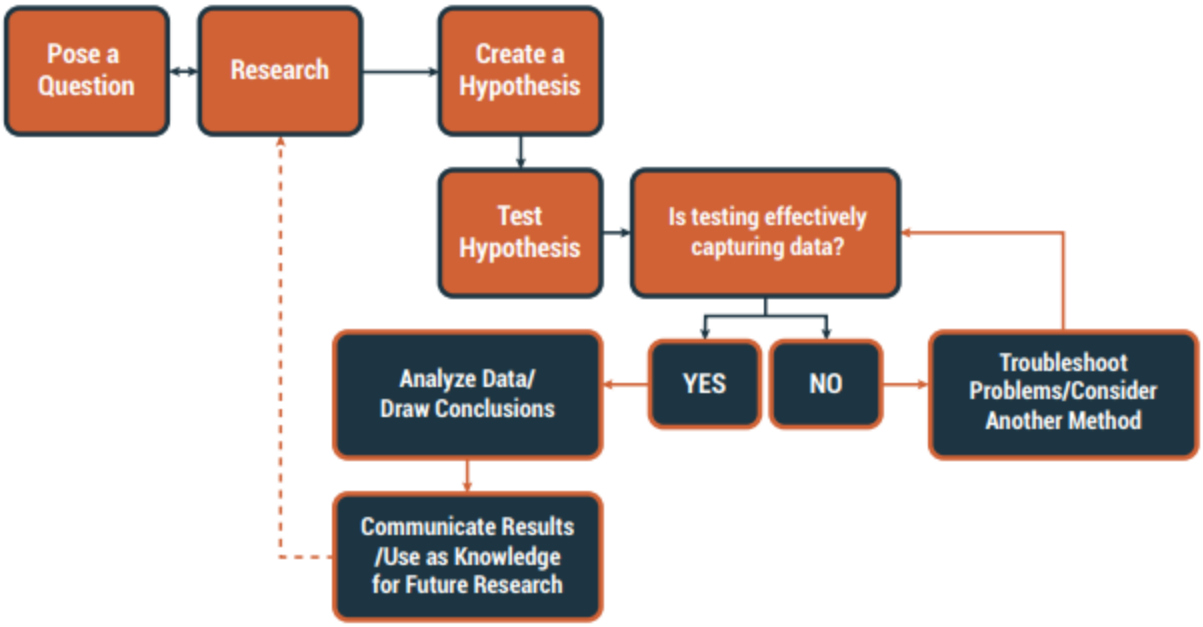


The procedure for corporate data analytics shares some parallels with the scientific approach but also has some key distinctions. For one, the method used to analyze company data may change with the specifics of the analysis. Data for testing may only sometimes require a new experiment, as the use of preexisting data could obtain by simply downloading it from a server. Data validation and verification are essential processes in commercial data analytics. Data obtained in a scientific experiment does not need to be validated because the investigation is conducted under strict laboratory conditions.

The cycle of corporate data analytics is ongoing and iterative when continuous improvement or another metric of improvement over time is the goal of the analytics activity.

In the context of projects with finite outcomes, the findings from one project can inspire more investigation, which in turn can inform the next iteration of the corporate data analytics cycle.

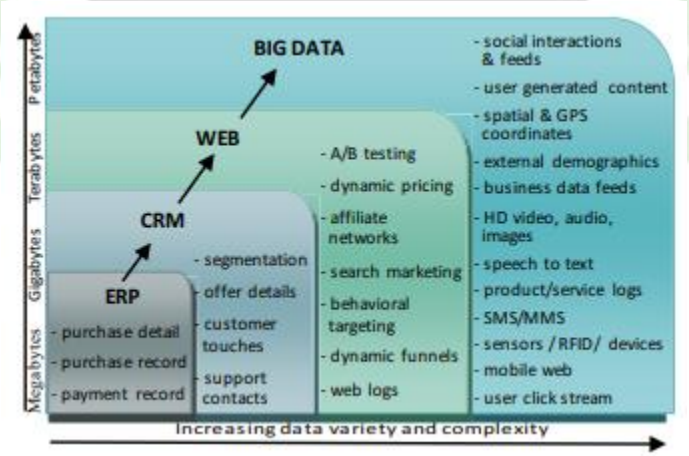
The Essence of Big Data:

There are three primary causes behind the present data explosion:

First, Information is being continuously gathered by hundreds of applications, including mobile sensors, social media services, and other relevant devices. Second, the declining data storage cost makes buying more space more appealing than erasing unnecessary information. Third, advances in machine learning and information retrieval methods over the past several years have made it possible to glean more insights from datasets. (Fernández, A., et.al, 2007)

Database memory sizes range from a few hundred megabytes to a few petabytes, as seen in the following Figure. ERP systems are proven to produce data that businesses then store and analyze in a data warehouse or database. However, customer relationship management (CRM) and web-based technologies primarily contribute to this exponential data growth.

The following Figure also shows the most common types of Big Data sources.



However, Big Data encompasses more than just massive datasets. Finding a new method of analysis, rather than collecting more data, is the primary obstacle.

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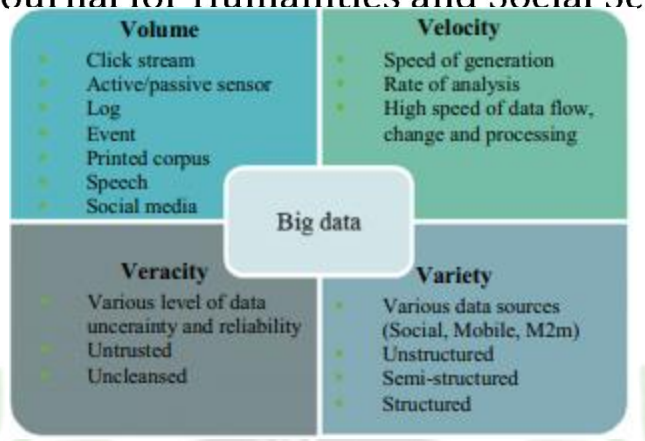
The primary features of Big Data are:

- Type of data - data unstructured,
- Size of data - 100 terabytes to petabytes,
- Way of information flow - a permanent inflow of data to the organization (in real-time),
- Basic analytical method - machine learning,
- Primary purpose – a creation of new products. (Wielki, J., 2014)

The term "Big Data" refers to a new type of data source that is distinct from traditional data repositories like databases and data warehouses. Companies that profit from big data differ from conventional data analysis settings in three crucial respects, as Davenport and colleagues point out.

First, they focus on information flows rather than data stores. Second, instead of data analysts, they rely on data scientists and the designers of new products and processes. Third, they are relocating analytics from the IT department to other departments inside the business, such as operations and manufacturing. The four primary components of Big Data are volume, velocity, veracity, and variety, and they necessitate a revolutionary leap forward from conventional data analysis. The following Figure illustrates these.



This diversity is what makes Big Data so massive. Structured, semi-structured, and unstructured data are the three main forms that Big Data can take. (Sagiroglu, S., et.al, 2013) While organized data may be easily imported into a data warehouse, unstructured data is haphazard and challenging to analyze. Semi-structured information does not have predefined fields but does use tags to organize its constituent parts. These days, the volume or amount of data much exceeds the realm of terabytes and petabytes. Data's massive scale and exponential growth have outpaced conventional storage and analysis methods. Not only does Big Data necessitate speed, but so must all operations. The organization should use big data for time-sensitive activities to get the most out of it. Since Big Data come from various sources, it is essential to verify their accuracy.

The value of the data is more important than the previously described definitions of the "V" dimensions. B. Frank dubbed this metric "Uber-V" since it emphasizes the monetary worth of the data to the enterprise. All other factors are secondary considerations. According to B. Frank, the ability to handle data in a way that is useful to the business is more important than the data's confidentiality, volume, or format. According to Steve Todd of Berkeley University, all of these

factors—known as the 4V's of Big Data—led to the following definition: When a conventional technological application fails to yield timely, cost-effective, and high-quality responses to data-driven issues, we have a "Big Data" problem. The unstructured nature of data is emphasized by other definitions as well, e.g., Rouse.

Big Data refers to the massive amounts of unstructured and semi-structured data generated by a business, which would be impractical to load into a traditional relational database.

A three-aspect approach" was presented, separating big data's technological, business, and social facets. As mentioned earlier, the technical component in the taxonomy highlights the importance of information technology and big data analysis techniques. Applications of Big Data, particularly its role in decision support, are the primary emphasis of the described categorization from a business perspective. The social side of Big Data refers to the social effects of the data analysis. All three factors are crucial when deciding which Big Data analytics technologies to deploy. (Pawełoszek, I., et.al, 2015)

Methods for traditional data processing vs. methods for "Big Data":

Big Data encompasses more than data itself, including IT systems, analytical software, and highly analytical personnel. Analyzing enormous datasets, or "big data," can help businesses learn valuable insights such as industry trends, customer preferences, etc. The insights gleaned through Big Data analytics have the potential to boost the company's efficiency and bottom line by revealing previously hidden connections and trends. These can offset the initial investment required to acquire specialized software and staff.

There are numerous distinctions between traditional analytics and Big Data analytics. Table 1 provides an overview of awards, albeit some are somewhat hazy. (LaValle, S., et.al, 2010)

	Big Data analytics	Traditional analytics
Type of data	Unstructured formats	Formatted in rows and columns
Volume of data	100 terabytes to petabytes	Tens of terabytes or less
Flow of data	Constant flow of data	Static pool of data
Analysis methods	Machine learning	Hypothesis-based
Primary purpose	Data-based products	Internal decision support and service

There are three primary areas where the analysis of Big Data has changed:

- The capacity to examine massive datasets without resorting to more manageable sample sizes,
- The ability to deal with low-quality, unstructured data
- The growing weight of correlations, which investigate possible links rather than root reasons for observed occurrences.

Finding connections and patterns that suggest "something is happening" is more important than explaining "why it's happening" when analyzing Big Data. This means that the traditional approach of making a hypothesis and looking for evidence to support it must be flipped. For all we know, the association between the two is merely coincidental. (Gupta, R., et al., 2012)

Data from outside and within a business are continuously fed into Big Data systems. As a result, Big Data analytics is founded on data acquired in real-time, leading to precise and instantaneous results.

Both large corporations and SMEs can benefit from analytical apps due to their generalizability and versatility. They make it possible to smoothly integrate intricate business processes and swiftly adapt to shifts in the operational level and the business environment. With their help, businesses can consistently monitor each method's health and adapt quickly to changing circumstances by altering their procedures on the fly. Traditional data analysis techniques, Big Data analytics architecture, and Big Data analytics software are all part of Big Data analysis.

Big Data in the Management of Business:

Data-driven decision-making refers to managers gathering, analyzing, and acting upon high-quality data.

According to studies presented at the 2013 EMC Forum:

- 39% of business owners think that Big Data is the key to their success,
- 19% of business owners believe Big Data has given them an edge over their competitors.
- 36% of business owners believe that using Big info will make their information safer and more secure.

By asking, "Which of the following business processes do you believe are the most important priorities for the application of big data now, and which will be the most important in three years?" researchers from the Economist Intelligence Unit hoped to determine the best areas to focus their efforts. (George G. et al., 2014)

Figure below shows the outcomes of their research:

42% of C-suite executives believe improving customer-facing procedures is the most critical area to apply big data. The two most common uses for big data analytics are in financial planning (32%) and sales (29%). (Bao, Q., et.al, 2016)

Priorities outside of the evolution of the product life cycle include operations, risk management, performance management, and similar matters. An extensive set of goals indicates a large market for Big Data applications across the company. It will be considerably more challenging to separate these concerns in three years. Customer insights and targeting will still be critical, but their relative importance will decrease as new priorities arise, as reported by respondents.

All facets of production generate vast quantities of data. Big Data aids businesses in determining product demand, productivity, and performance by a wide range of corporate objectives. With the use of Big Data, factories can pinpoint the exact location where a defective product is made.

The following are examples of when big data analysis is applied in enterprise management:

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- reengineering essential company operations
- Enhancing strategic decision-making,
- determining which vendors offer the best value for timely product delivery,
- Innovation in Manufacturing;
- identify variations in machinery and processes that may be precursors to quality issues,
- Accounting receivables analysis, payment forecasting, asset management,
- the determination of which advertising initiatives result in increased site visits, consumer participation, and product sales;
- customer behavior forecasting, customer relationship management,
- maximizing profits by adjusting marketing strategies,
- redefining of product,
- optimization of sales resource allocation and product mix,
- group-based information curation,
- Using a supply-and-demand model

Big Data is still an emerging concept, so firms often encounter resistance when trying to put it into practice. According to the Big Data + Report findings, the following challenges are the most pressing for Polish businesses.

- a scarcity of trained professionals — 29%
- high expenses of exploitation (27%);
- a lack of clarity around Big Data's intended use and justification for deployment (22%);
- intricate technology that fails to provide the predicted 7 percent in profit. (Polska, C., 2014)

Some organizations do something about the problems they find. IT businesses work to provide solutions that are less expensive, more efficient, and more "user-friendly," while universities train future data scientists and analysts. However, mental obstacles, lack of Big Data knowledge, and aversion to change provide the most significant challenges.

Conclusions:

Big Data analytics can benefit many facets of business administration, including strategic management and stakeholder management. To put it another way, if you're looking for an example of a company that's bucking the trend, look no further than the booming tech industry.

The following is a collection of suggestions for businesses interested in adopting Big Data solutions:

- Confirm the company's information strategy in light of Big Data needs, such as the necessary hardware, software, Big Data analytics application landscape, and "data science" and "data analyst" expertise.
- realign the business strategy with the "new" information strategy, and the business strategy with the opportunity presented by the "new" business processes.
- design malleable models of doing business.
- Create a company-wide information culture, in a data-driven company, "What do we think?" is not the first question asked. However, "What do we known?"
- restructure how choices are made. Decisions informed by data are frequently the best ones to make.

- sift through the company's information resources and pull out any relevant data you can use.
- Find out what more information has to be gathered in step.
- Find fresh informational channels.
- employ real-time Big Data analysis because some data loses value over time.

With the advent of Big Data and improved analytical tools, businesses now have a chance to differentiate themselves in the marketplace by focusing on analytics. The research contributes to the openness of recently conducted studies on data-driven decision-making. (Jelonek, D., et.al, 2014)

References:

- Davenport, T. H. (2009). Make Better Decisions. Harvard Business Review.
- Kiron, D., Prentice, P.K., & Ferguson, R.B. (2012). Innovating with analytics. MIT Sloan Management Review, 54(1), 47–52.
- Grover, V., Chiang, R. H., Liang, T. P., & Zhang, D. (2018). Creating strategic business value from big data analytics: A research framework. Journal of Management Information Systems, 35(2), 388-423.
- Beyer, M. (2011). Gartner Says Solving 'Big Data' Challenge Involves More Than Just Managing Volumes of Data. *Gartner*. *Archived from the original on*, *10*.
- Jelonek, D. (2017). Big Data Analytics in the Management of Business. In MATEC Web of Conferences (Vol. 125, p. 04021). EDP Sciences.

- Kraska, T. (2013). Finding the needle in the big data systems haystack. *IEEE internet Computing*, *17*(1), 84-86.
- Raghupathi, W., & Raghupathi, V. (2021). Contemporary business analytics: An overview. Data, 6(8), 86.
- Delen, D., & Ram, S. (2018). Research challenges and opportunities in business analytics. *Journal of Business Analytics*, *1*(1), 2-12.
- Brock, V. F., & Khan, H. U. (2017). Are enterprises ready for big data analytics? A survey-based approach. *International Journal of Business Information Systems*, *25*(2), 256-277.
- Boeije, H. (2002). A purposeful approach to the constant comparative method in the analysis of qualitative interviews. *Quality and quantity*, *36*, 391-409.
- Marr, B. (2016). *Key Business Analytics: The 60+ business analysis tools every manager needs to know*. Pearson UK.
- Rahul, K., & Banyal, R. K. (2020). Data life cycle management in big data analytics. *Procedia Computer Science*, *173*, 364-371.
- Fernández, A., del Río, S., López, V., Bawakid, A., del Jesus, M. J., Benítez, J. M., & Herrera, F. (2014). Big Data with Cloud Computing: an insight on the computing environment, MapReduce, and programming frameworks. Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, 4(5), 380-409.
- Wielki, J. (2014). Analysis of the possibilities of using big data in e-business. *Prace Naukowe/Uniwersytet Ekonomiczny w Katowicach*.

- Sagiroglu, S., & Sinanc, D. (2013, May). Big data: A review. In *2013 international conference on collaboration technologies and systems (CTS)* (pp. 42-47). IEEE.
- Pawełoszek, I., & Wieczorkowski, J. (2015, September). Big data as a business opportunity: an Educational Perspective. In *2015 Federated Conference on Computer Science and Information Systems (FedCSIS)* (pp. 1563-1568). IEEE.
- LaValle, S., Lesser, E., Shockley, R., Hopkins, M. S., & Kruschwitz, N. (2010). Big data, analytics and the path from insights to value. *MIT sloan management review*.
- Gupta, R., Gupta, H., & Mohania, M. (2012). Cloud computing and big data analytics: what is new from databases perspective?. In *Big Data Analytics: First International Conference, BDA 2012, New Delhi, India, December 24-26, 2012. Proceedings 1* (pp. 42-61). Springer Berlin Heidelberg.
- Mannering, F., Bhat, C. R., Shankar, V., & Abdel-Aty, M. (2020). Big data, traditional data and the tradeoffs between prediction and causality in highway-safety analysis. Analytic methods in accident research, 25, 100113.
- George, G., Haas, M. R., & Pentland, A. (2014). Big data and management. *Academy of management Journal*, *57*(2), 321-326.
- Bao, Q., Wang, J., & Cheng, J. (2016). Research on ontology modeling of steel manufacturing process based on big data analysis. In *MATEC Web of Conferences* (Vol. 45, p. 04005). EDP Sciences.
- Polska, C. (2014). Raport Big data+, Systemy analityki wielkich zbiorów danych w polskich organizacjach. *Computerworld Polska*.

- Jelonek, D., Stępniak, C., Turek, T., & Ziora, L. (2014). Identification of mental barriers in the implementation of cloud computing in the SMEs in Poland. In *2014 Federated Conference on Computer Science and Information Systems* (pp. 1251-1258). IEEE.