

The Future of Business Intelligence

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Abstract: Analysts that can conduct customer-driven business intelligence (BI) analyses naturally have social media voices (VoC) that they may use as proof of quality. Researchers in the field of business intelligence (BI) have not yet addressed the dearth of studies addressing these extraordinary data sources and content types (e.g., social media, intellectual property). That was the intended goal of this study, which systematically reviewed the leading business intelligence research papers and evaluated the value of social network data for BI studies. Data quality, processing capacity, updating capabilities, and framework are the main areas of comparison between social network data and other available data sources (such as grey literature and public service data), as determined after careful consultation with experts. The phrase "business intelligence" (BI) is used in the field of business management to describe software and hardware solutions that help businesses collect, store, retrieve, and analyze information and data related to their daily operations. In order to make complex decisions, businesses use a process known as business intelligence, which involves using a mathematical model to extract, transform, manage, and analyze large amounts of data. Fundamental to business intelligence are databases, data mining, and technologies that aid in decision-making. The purpose of this study is to provide a comprehensive analysis of popular Business Intelligence tools.

Keywords: Business Intelligence, Data quality, Data security

1. Introduction

A computer-based system that corporations employ for decision-making is known as business intelligence (BI). The system sifts through large data warehouses and data marts storing firm information in search of relevant information in order to produce valuable reports and discoveries. Business intelligence (BI) applications encompass a wide range of statistical methods, data mining techniques, reporting, benchmarking, OLAP, DSS, forecasting, and predictive analysis.

It helps businesses make better decisions by giving them useful information on their workers, clients, vendors, and other business partners [1]. In order to aid in decision making, a collection of tools known as business intelligence (BI) can be utilized to convert raw data into valuable information. Reporting capabilities, data cluster identification tools, data mining technique support, predictive analysis, business performance management, and BI are all parts of business intelligence. Decision assistance is the ultimate goal of business intelligence. Business intelligence (BI) solutions, also known as decision support systems (DSS) or fact-based support systems, actually provide customers with the ability to analyze their data and extract insights.

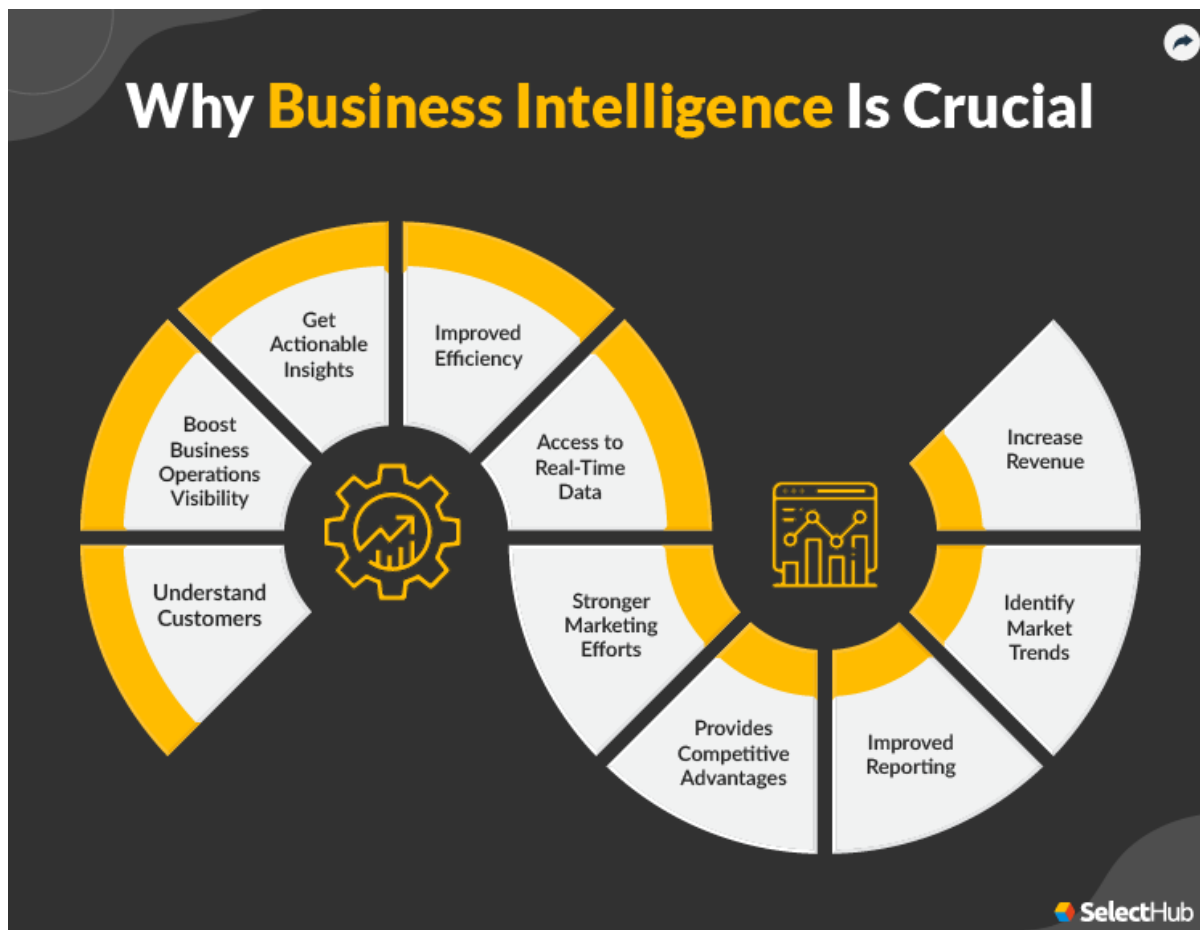
It is common practice for data warehouses to provide the data source for business intelligence tools. The logic behind this is simple: a data warehouse stores all of an organization's cleansed, aggregated, and conformed data from all of its production systems in one central area. This business intelligence tool allows users to fully immerse themselves in data analysis. The most effective and strong method for consumers to express their ideas on social

media has been available for about ten years due to the accessibility and adaptability of these platforms [2]. The majority of customers also freely express their opinions on products and services using various WWT platforms such as Amazon, Facebook, Twitter, and Flipkart. To be more precise, the vast majority of social media product reviewers simply wax poetic about how much they love a product or service, but influential users give an in-depth rundown of all the good points and honest criticism of the bad. Since the majority of consumers are inclined to rely on the opinions of those who have used a product before, these subjective consumer evaluations may determine whether other prospective buyers purchase a product or not.

1.1. Why business intelligence is important

In a nutshell, business intelligence is there to help companies run more efficiently by analyzing and interpreting pertinent data. Businesses may enhance their strategies and operations by transforming their data into valuable insights using the correct business intelligence (BI) tools and processes.

Better business decisions based on these insights boost productivity and revenue, which in turn accelerates company growth and increases profits [3]. Businesses struggle to reap the benefits of data-driven decisions in the absence of business intelligence (BI). Instead, executives and employees are mostly expected to rely on other criteria, like past experiences, intuition, and gut feelings, when making key business decisions. Although those approaches can lead to sound conclusions, they are rife with mistakes and omissions due to the absence of supporting data.



1.2 Understand Customers

Using sound business intelligence strategies, firms may learn more about their customers by analyzing their buying patterns and creating in-depth profiles and personas. Better products and more satisfying user experiences are both made possible by their efforts. One way in which companies use business intelligence to learn more about their customers is through customer segmentation.

In order to keep current customers and attract new ones, most businesses use real-time consumer feedback. Based on factors such as the products purchased, the frequency of purchases, the channels used to make the purchases, and the timing of the purchases, customer segmentation enables marketers to more precisely categorize customers. Customers are provided with a seamless experience by these segments through personalized discounts, offers, and more.

1.3 Boost Business Operations Visibility

With the help of business intelligence, companies can see and manage their processes more effectively. It aids in the detection and correction of inefficiencies or mistakes in their current procedures. Additionally, it enables people to anticipate unexpected obstacles and respond appropriately.

If a logistics company is having trouble with late delivery, it could help to figure out what's causing them and where they're happening. Services can also be enhanced with this degree of understanding of how businesses operate.

1.4 Get Actionable Insights

It is essential to provide adequate data to support the judgments that you make for your company. BI provides you with access to vast volumes of information, allowing you to acquire insightful knowledge and improve your decision-making abilities. Among these measures is the percentage of clients who stop shopping after adding items to their shopping baskets. The business is able to take the required steps to reduce the number of customers who abandon their shopping carts as a result of this data, which provides an insight of where customers are dropping off.

1.5 Improved Efficiency

The implementation of a powerful business intelligence solution gives you the ability to improve the overall performance of your company, as well as the efficiency of your operations, and to raise your income. Reducing the amount of time that teams have to wait for report requests and increasing the productivity of all teams that have self-service capabilities are both benefits of making data available across all departments. Every single person working for the organization ought to have access to the data. Teams are able to stay informed and make decisions based on data with its assistance.

1.6 Access to Real-Time Data

A business intelligence solution gives users access to information that is updated in real time, which, when used in the process of creating key data reports, helps to reduce

the likelihood of making mistakes. By having access to real-time data, you can track the firm's health, find and fix operational inefficiencies, react to temporary market fluctuations, and enhance customer experiences.

1.7 Stronger Marketing Efforts

BI solutions enable you to design marketing initiatives that increase return on investment (ROI). It provides a number of important indicators, including customer acquisition cost (CAC), cost per lead (CPL), campaign click-through rate (CTR), and others in the same vein.

In addition to this, it gives you the ability to comprehend staff productivity, revenue, profit margins, sales in particular regions, department-specific performances, and any other relevant information. It has the ability to reveal both the strengths and flaws of the operations and processes found in a firm. Moreover, it has the capability to set up alerts for tracking critical metrics that are most important to your company.

1.8 Provides Competitive Advantages

Solutions for business intelligence give you the ability to learn about what your rivals are doing, including their plans, tactics, and other aspects of their operations. Providing a seamless experience for your customers while simultaneously improving your products and services is made possible by this. In addition, a business that keeps a tight eye on its internal procedures and systems is constantly one step ahead of everything else in the industry. In order to carry out competitive analysis, you will need to manage and modify vast amounts of data. Additionally, budgeting, planning, and forecasting are strong techniques to keep ahead of the competition and maintain a competitive advantage. Tracking the sales and marketing performance of competitors allows you to discover how to differentiate your own products and services from those of your competitors.

1.9 Improved Reporting

In addition to slicing data in order to discover previously hidden insights and trends, these technologies assist you in the creation of robust reports. These insights enable firms to improve their decision-making processes and acquire a competitive advantage over their rivals by providing them with the ability to generate ad hoc reports. Utilizing data from a variety of sources, including sales, operations, and finances, monitor key performance indicators (KPIs) using KPI software. Reports should be generated in real time so that decisions can be made accurately. Graphical representations that are simple to read, such as tables, charts, and graphs, are included in reports. You are able to experiment with a variety of variables and evaluate trends, patterns, and insights through the use of interactive reports.

1.10 Identify Market Trends

Identifying sales patterns and focusing on places that are eligible for enormous profit margins can be accomplished by utilizing data from external markets. For the purpose of

locating new markets, consumer data and market conditions should be analyzed. Certain organizations make advantage of social media in order to evaluate the market by analyzing the comments and feedback provided by users. It has been demonstrated that social media is an invaluable resource for gaining insights into the preferences and pain areas of customers.

1.11 Increase Revenue

Utilize business intelligence technologies to inquire about the reasons behind the occurrence of certain events by comparing them across a number of different dimensions. With the use of business intelligence, you may enhance operations, identify sales problems, obtain feedback from customers, and evaluate competitors in order to increase revenue [4].

2. Review of Literature

Discovery, perception, collecting, analysis, and derivation are all part of Business Intelligence (BI), which is described as "drawing information or awareness of consistency in different market contexts." So goes the whole process. According to [5,] a business intelligence framework not only gives information workers and entrepreneurs a more in-depth perspective of their companies or sectors, but it also gives them a method for making decisions more quickly. In addition, a group of exceptionally qualified physicists who assessed the accessible vital market data amalgamated the terms "business intelligence" (BI) after the late 1990s. As far as the authors are aware, the original BI systems used a data-centric approach to evaluating standard evidence, such as trademarks, scientific papers, and company records.

A systemic strategy was proposed, according to which a technology-intensive company might be recommended to receive realistic technological prospects. The technological resources of the company's patents would be protected, and the technology portfolio of affiliated enterprises would be defined, all through collective screening, to achieve this goal. Their findings point to potential ways forward in the creation of validated technologies utilized by large organizations, which is particularly helpful for small and medium-sized businesses that are just starting out and have a limited budget and human resources.

2.1 Business intelligence systems in higher education institutions

There is an obvious need for HEIs to enhance decision making across the board and at every level. This occurs because judgments are often made by HEIs without the use of particular data or analysis. A unique characteristic of HEIs is the diversity in their mission statements and management approaches. When planning how to achieve the goals and objectives set out for a higher education institution (HEI), it is crucial to keep the institution's organizational culture in mind. This is because the culture of a HEI greatly influences the methods used to make decisions and implement policies. To ensure they are

meeting the goals set out in their strategic plans, HEIs need relevant data to track their progress [6]. The main key performance indicators (KPIs) must be identified and measured for higher education institutions for their performance to be successful. When it comes to running the day-to-day business and making important decisions, the administration of HEIs is totally dependent on information systems (IS). Though the deployment of business intelligence (BI) systems is necessitated by the level of complexity and the need to integrate all of the HEI's information systems, decision support systems (DSS) are a subset of information systems designed to aid in this endeavor. Business intelligence (BI) integrates data storage and collection with knowledge management through the use of apps, tools, infrastructures, and practices that provide access to and analysis of information that is usually not available in ordinary reports. Colleges and universities can improve their efficiency and effectiveness in making decisions by following this strategy.

In point of fact, business intelligence makes it possible to generate dashboards and aggregation reports that can be generated in a fairly straightforward manner. This is how a business intelligence system makes use of information technologies and infrastructures to employ key performance indicators (KPIs) in order to evaluate the performance of higher education institutions [7].

The identification of difficulties and the implementation of management methods that are effective can lead to improvements in the management of processes and infrastructure. Higher education institutions, on the other hand, should make sure that their strategies are in line with the resources they have available to them. It is also important to note that higher education institutions are able to better align their resources and strategic opportunities, as well as the possibility of boosting socio-economic development and improving their curricula and teaching methods in order to achieve sustainable development [8]. This is why it is important to define and prioritize areas of activity. Based on an examination of the requirements of higher education institutions, [9] highlights the significance of information management in the process of developing management information systems. A procedure that is integrated into the administrative activities of higher education institutions (HEIs) is what constitutes good information management, which can improve the efficiency of decision making in schools of higher education. When all of the components that are required to duplicate the research and methodologies are properly recorded by tools that are suitable for this purpose, decision-makers at higher education institutions (HEIs) can benefit from information visualization. When it comes to students, teachers, academics, research procedures, and financial aspects, higher education institutions (HEIs) acquire and produce a great amount of data through their information systems (IS) in order to improve their strategic results.

The governance of information technology plays a significant part in the overall success of higher education institutions [10]. Additionally, it alludes to the need of IT governance in achieving better academic information

system performance and offering assistance for IT-based educational services. The purpose of this is to ensure that the strategic goals of higher education institutions are aligned with the IT deployment. Business intelligence (BI) is thus a useful tool for managing strategic performance. Decisions in HEIs can be better supported by its users' abilities to gather, combine, access, and evaluate data. Business intelligence (BI) needs to consider and prioritize analytical factors if it is to fulfill the demands of current performance management. According to [11], a business intelligence architecture cannot be complete without the following four parts, which are detailed below: There are three parts to ETL: (i) the system source, which is data collection; (ii) the data acquisition process, which is data transfer between repositories; and (iii) the data warehouse, which stores the information collected by ETL. (iv) Tools for reporting and analysis: these enable the handling and interpretation of data. Statistical and predictive analysis, dashboards, regular and ad hoc reporting, and analyses of dynamic processes are all part of this set of tools. As mentioned in [12], a business intelligence architecture is believed to have six steps: (1) Metadata is the technical and business term for information stored in a data layer repository. (2) Data sources can be either internal or external. (3) Data management is the process of handling data, which involves a data plan and consistent methods for accessing, organizing, managing, maintaining, and planning data for analysis. (4) Data storage is the ability to store data in databases. (5) Data analysis is the handoff of data from the source to the user. (vi) The resources and tools of business intelligence (BI): By combining BI tools with analytical performance, data from BI resources can be studied to produce reports, graphs, dashboards, or other analytical outputs.

2.2 Strategic Management

Improvements in process and infrastructure management can be achieved through the identification of difficulties and the implementation of effective management solutions. However, it is essential for higher education institutions to ensure that their strategies are in line with the resources they have available. In order to attain sustainable development, higher education institutions (HEIs) can improve their curricula and pedagogical practices, increase socioeconomic development, and better align their resources and strategic opportunities by defining and prioritizing areas of activity [13]. It is important to take note of this. When it comes to building strategic capacity, it's important to consider internal organizational capacities including academic human resource management, cultural norms, and organizational governance [14]. Indeed, universities and colleges have much of the responsibility for overseeing and controlling their own operations, budgets, and personnel.

They also have the authority to make decisions regarding their organizational operations, which includes the manner in which decisions are made regarding the priorities, goals, and objectives of the institution, as well as the distribution of resources.

By implementing management methods that are focused toward quality and financial sustainability, higher education institutions (HEIs) are attempting to increase their competitiveness. To achieve this goal, performance assessment methods are used, which take into account a broad range of monetary and non-monetary factors. These metrics help decision-makers see the big picture by illuminating the interconnections between the different strategic goals. In addition, these steps make it easier for employees to understand how their work relates to the overall goals. In addition, these steps help define priorities and distribute resources in a way that supports strategic goals [15].

In order to ensure the success and sustainability of higher education institutions over the long term, the study [16] suggests implementing frameworks that highlight the importance of strategic management. In a comprehensive sense, decision making encompasses all the policies, strategies, and actions that HEIs do, and it affects all that HEIs do. At this stage, decisions are being made strategically. One example is how the number of students enrolled in a particular semester affects the allocation of resources like money, faculty, and physical space at a university [17].

Because of this, it is essential for higher education institutions to have a comprehensive grasp of their goals and the strategies they need to implement in order to successfully reach those goals.

3. Business Intelligence Implementation in Tourism

Data collection, automation, and the production of information that may be transformed into knowledge are the three main functions of business intelligence (BI), as defined by research [18], which in turn helps organizations make better decisions. Typically, a business intelligence architecture will consist of four main parts: a data warehouse, business analytics, a user interface, and business performance management (BPM) [19].

It is the responsibility of the technical staffs in a typical business intelligence deployment to prepare and manage the data in order to transform it into information that business users can use. This is illustrated in Figure 1.

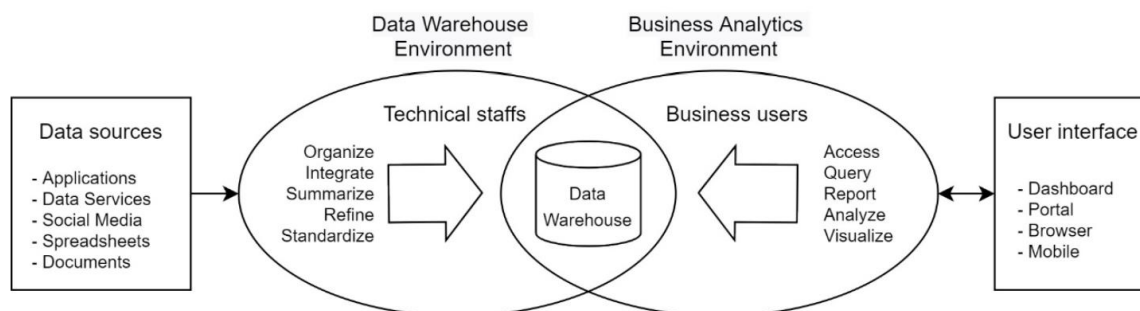


Figure 1: A setting for the deployment of business intelligence

In this part, we offer the results of a few studies that looked at how the tourist sector might use analytics and business intelligence. One of the most crucial parts of business intelligence research for the tourist sector is functionality, which encompasses data visualization, analysis, and forecasting [20]. This is backed by readily usable data that is currently available. However, it is disheartening that most studies are still carried out in affluent nations such as the US, China, and Europe. This disparity exists for a number of reasons, including the quantity and quality of open data sites as well as the fact that their consumption is still relatively low in developing nations.

On the other hand, there are other nations that have already begun the process of development, such as India and Thailand [21]. Additionally, there are some business intelligence models that do not describe the problems that arise during implementation [22, 23]. Several other studies, with the exception of one that discusses the utilization of data provided for academic reasons [24], do not provide an explanation of the privacy concern that arises when getting data from third parties through different web crawling techniques. Additionally, there are also business intelligence frameworks that do not have

visualization front ends and instead focus solely on the data processing side of things.

3.1 Public sector management

With the introduction of the business intelligence framework, efforts have been made to streamline and enhance data sharing and interoperability across government agencies, as well as to solve the problems associated with consolidating data from various local agencies into a single data lake [25]. Information such as arrivals (the total number of guests entertained) and length of stay (the total number of nights spent) can help the government assess the capacity of lodging facilities and the number of beds and rooms associated with them.

3.2 Transport management

The processes and structures that are utilized to manage the physical transportation demands and requirements of tourists are included in the travel and tourism industry's transport management. Transport operators are able to construct attractive and efficient packages, alter demand-based service tariffs, and effectively manage their

resources with the use of data collected from cars, travelers, and social networks [26]. Through the utilization of tour data analytics, travelers would also benefit from inexpensive pricing as well as the quality of services that are tailored to their specific requirements and preferences. A more comprehensive viewpoint would be beneficial to

the tourist destination (which may be a town), as it would allow for the promotion of the area's sights and culture, which would result in the arrival of additional tourists. In addition, new commercial activities will be established, and competitive advantages will be achieved, which will result in the establishment of a popular tourist destination.

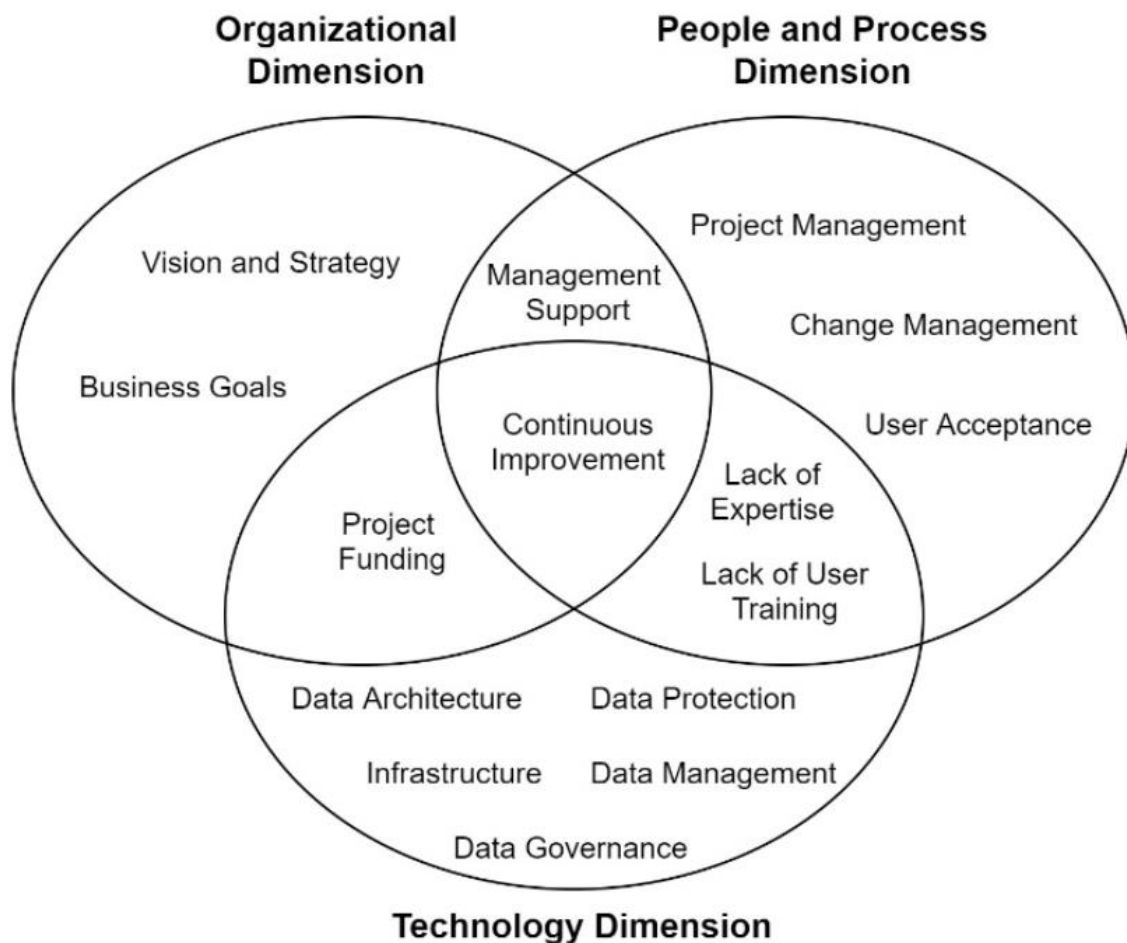


Figure 2: Important concerns about the use of BI in the travel industry

Important problems can arise throughout the implementation of business intelligence, and as seen in Figure 2, some of these problems can connect to and impact more than one dimension. Identifying the necessary and superfluous components is critical for meeting the company's requirements.

As a result of the fact that it is contingent upon the extent to which the firm is able to handle the challenges, there are no specific rules that govern the features that a company may want or need to adopt. As stated in [27], Prognostic analytics, trend indicators, profitability analysis, benchmarking, budgeting, and forecasting are some of the more advanced aspects that may be linked with businesses. An example of an advanced feature would be all of these things. Guests, eateries, hotels, transportation companies, online travel agencies, destination management, suppliers, government agencies, and data consumers are the primary constituents of the tourism industry's business intelligence system, according to our findings. Our research indicates that the following core business intelligence system functionalities are essential for tourism industry

stakeholders to have at their disposal when making day-to-day choices. Data visualization, reporting and dashboards, analytics, key performance indicators, and metrics all fall under this category of tasks. After these functions are successfully implemented, companies can add additional complex functions to improve their analytical and decision-making capacities. Indicators of trends, tools for strategic planning, analyses of profitability, benchmarking, budgeting, and forecasting are all part of these responsibilities. Also, we found out that underdeveloped countries could have to build a tourist data center or a centralized coordination that is governed by a consortium, unlike affluent nations that mostly have controlled data and analytical frameworks. The main reason for this is that data and analytical frameworks in industrialized nations are mostly regulated.

4. Conclusion

In this study, business intelligence tools were addressed as a more appropriate option for businesses to use when

conducting data analytics. It was emphasized in this article on the reasons why business intelligence (BI) tools are becoming increasingly popular in this era of real-world business, as well as the benefits that these tools offer, which include timely answers, single-point access to data, improved performance, and stronger relationships with customers and suppliers. This study has also specifically investigated the ways in which business intelligence tools are tied to other systems and business intelligence approaches. In conclusion, we conducted an analysis of ten well-known business intelligence (BI) software solutions using a variety of criteria. This analysis will assist both current and future researchers in selecting appropriate BI tools for their respective research endeavors. The objective of this study was to investigate the application of social networking in the field of business intelligence (BI) and the analysis of recent scientific advancements. The evaluation of free social media material as input and the in-depth examination of social media articles were the means by which this was accomplished. BI research that is considered mainstream. The outcomes of the evaluation, which were acquired after suitable expert analysis, have demonstrated that social media are of utmost significance for the study of business intelligence (BI) due to the fact that the data are gathered, processed, and arranged in huge quantities. As a result, we came to the conclusion that the methodological appropriateness of social networking in business intelligence analysis is higher than that of other accessible data.

References

- [1] AL. Sayeth Saabith, "Business Intelligence Tools – Systematic Review", International Journal of Research in Engineering and Science (IJRES) ISSN (Online): 2320-9364, ISSN (Print): 2320-9356 www.ijres.org Volume 10 Issue 10 | October 2022 | Pp. 394-408.
- [2] Alkhodair, Ding, Fung, & Liu (2019). Detecting breaking news rumours of emerging topics in social media. Information Processing Management.
- [3] [7]. Tripathi, A., Bagga, T., & Aggarwal, R. K. (2020). Strategic impact of business intelligence: A review of literature. Prabandhan: Indian Journal of Management, 13(3), 35-48. <https://express.selecthub.com/#/products>
- [4] <https://www.selecthub.com/business-intelligence/why-business-intelligence/>
- [5] Olanrewaju, Hossain, Whiteside, & Mercieca (2020). Social media and entrepreneurship research: A literature review. International Journal of Information Management, 50, 90–110.
- [6] Sorour, A.; Atkins, A.S.; Stanier, C.F.; Alharbi, F.D. The Role of Business Intelligence and Analytics in Higher Education Quality: A Proposed Architecture. In Proceedings of the 2019 International Conference on Advances in the Emerging Computing Technologies (AECT), Madinah, Saudi Arabia, 10 February 2020; IEEE: Al Madinah Al Munawwarah, Saudi Arabia, 2020; pp. 1–6
- [7] Sarrico, C.S. Quality Management, Performance Measurement and Indicators in Higher Education Institutions: Between Burden, Inspiration and Innovation. *Qual. High. Educ.* **2022**, *28*, 11–28
- [8] Mukhtar, M.; Sudarmi, S.; Wahyudi, M.; Burmansah, B. The Information System Development Based on Knowledge Management in Higher Education Institution. *Int. J. High. Educ.* **2020**, *9*, 98.
- [9] Vilchez-Román, C.; Sanguinetti, S.; Mauricio-Salas, M. Applied Bibliometrics and Information Visualization for Decision-Making Processes in Higher Education Institutions. *Libr. Hi Tech* **2020**, *39*, 263–283.
- [10] Combita Niño, H.A.; Cómbita Niño, J.P.; Morales Ortega, R. Business Intelligence Governance Framework in a University: Universidad de La Costa Case Study. *Int. J. Inf. Manag.* **2020**, *50*, 405–412
- [11] Srivastava, G.S.; Muneeswari, S.; Venkataraman, R.; Kavitha, V.; Parthiban, N. A Review of the State of the Art in Business Intelligence Software. *Enterp. Inf. Syst.* **2022**, *16*, 1–28.
- [12] Gulua, E. Management of Process and Infrastructure in Higher Education Institution. *Eur. J. Interdiscip. Stud.* **2019**, *5*, 27
- [13] Thoenig, J.-C.; Paradeise, C. Higher Education Institutions as Strategic Actors. *Eur. Rev.* **2018**, *26*, S57–S69.
- [14] Antunes, M.; Mucharreira, P.; Justino, M.R.; Texeira, J. The Relevance of Financial and Non-Financial Indicators to Assess Quality and Performance of Higher Education Institutions. In Proceedings of the 13th International Technology, Education And Development Conference (INTED2019), Valencia, Spain, 11–13 March 2019; pp. 2699–2705.
- [15] Sawhney, S.; Kumar, K.; Gupta, A. Adopting Strategic Management in Higher Education in India: Need, Challenges and Ideas. *Int. J. Manag. Pract.* **2019**, *12*, 246.
- [16] AlKhatnai, M.; Shawyun, T. Powering HEI Survey System for Data Analytics. 2022, Volume 2. Available online: http://www.seairweb.info/journal/articles/JIRSEA_v20_n02/JIRSEA_v20_n02_Article04.pdf
- [17] Nyanga, C., Pansiri, J., & Chatibura, D. (2020). Enhancing competitiveness in the tourism industry through the use of business intelligence: A literature review. *Journal of Tourism Futures*, 6(2), 139–151. <https://doi.org/10.1108/JTF-11-2018-0069>
- [18] Sharda, R., Delen, D., & Turban, E. (2018). Business intelligence, analytics, and data science: A managerial perspective (4th ed.). Pearson.
- [19] Mariani, M., Baggio, R., Fuchs, M., & Höepken, W. (2018). Business intelligence and big data in hospitality and tourism: A systematic literature review. *International Journal of Contemporary Hospitality Management*, 30(12), 3514–3554. <https://doi.org/10.1108/IJCHM-07-2017-0461>
- [20] Nanthamornphong, A., Holmes, J., & Asawateera, P. (2020, June). A case study: Phuket City Data Platform. Proceedings of the 17th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTI-CON) (pp. 717–722). Phuket, Thailand: IEEE. <https://doi.org/10.1109/ecticon49241.2020.9158101>

- [21] Hlee, S., Yhee, Y., Chung, N., & Koo, C. (2019). Service innovation by design thinking methods: A case of Seoul children's grand park (SCGP). *E-Review of Tourism Research*, 17(2), 271–291. <https://ertr-ojstamu.tdl.org/ertr/article/view/511>
- [22] Stylos, N., & Zwiendelaar, J. (2019). Big data as a game changer: How does it shape business intelligence within a tourism and hospitality industry context? In S. Marianna, R. Royo, & T. Mike (Eds.), *Big data and innovation in tourism, travel, and hospitality: Managerial approaches, techniques, and applications* (pp. 163–181). Springer. https://doi.org/10.1007/978-981-13-6339-9_11
- [23] Jimenez-Marquez, J. L., Gonzalez-Carrasco, I., Lopez-Cuadrado, J. L., & Ruiz-Mezcua, B. (2019). Towards a big data framework for analyzing social media content. *International Journal of Information Management*, 44, 1–12. <https://doi.org/10.1016/j.ijinfomgt.2018.09.003>
- [24] Michele, P., Fallucchi, F., & De Luca, E. W. (2019, October). Create dashboards and data story with the data & analytics frameworks. In E. Garoufallou, F. Fallucchi, & E. W. De Luca (Eds.), *Proceedings of the 13th International Conference on Metadata and Semantic Research (MTSR 2019)* (pp. 272–283). Rome, Italy: Springer. https://doi.org/10.1007/978-3-030-36599-8_24
- [25] Moustaka, V., Vakali, A., Zikos, N., Tsirakidis, T., & Anthopoulos, L. G. (2019, May). TOMI: A framework for smart tourism on the move innovation. In L. Liu & R. White (Eds.), *WWW '19: Companion Proceedings of the 2019 World Wide Web Conference* (pp. 123–129). San Francisco, USA: ACM. <https://doi.org/10.1145/3308560.3317051>
- [26] Rodrigues, J. P., Sousa, M. J., & Brochado, A. (2020). A systematic literature review on hospitality analytics. *International Journal of Business Intelligence Research*, 11(2), 20–28. <https://doi.org/10.4018/ijbir.20200701.oa2>
- [27] Viglia, G., De Canio, F., Stoppani, A., Invernizzi, A. C., & Cerutti, S. (2021). Adopting revenue management strategies and data sharing to cope with crises. *Journal of Business Research*, 137, 336–344. <https://doi.org/10.1016/j.jbusres.2021.08.049>