

Driving Business Success: Exploring the Implementation and Improvement of Big Data Analysis and Business Intelligence in Selected Companies in Zhejiang, China

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Abstract. The study investigates the application and enhancement of big data analysis and business intelligence in selected companies in Zhejiang province, focusing on aspects such as business profile, adoption levels, benefits, implications, and challenges. Limited to selected companies in Zhejiang, the research aims to propose a tailored enhancement plan based on survey data. While it doesn't compare with other organizations and relies on self-reported data, the study delves into specific aspects of the selected companies, potentially requiring customization for wider applicability. Conducted from June to October 2023, the research utilizes a descriptive-quantitative design, emphasizing systematic data collection. With Zhejiang, China as the locale, 100 respondents from five companies are chosen through purposive sampling. A comprehensive survey questionnaire covers demographics, adoption levels, benefits, and challenges.

Results highlight the selected companies in Zhejiang's adaptability in Healthcare, Finance, and Marketing sectors, emphasizing strong data analytics for real-time insights and strategic decisions. The system excels in data accuracy, integration, governance, security, compliance, scalability, and skills development. Recommendations include cross-sector collaborations, continuous training, customer-centric strategies, addressing skills gaps, and fostering interdepartmental collaboration, ensuring the selected companies optimize strengths and foster innovation and adaptability.

Keywords: Big Data Analysis; Business Intelligence; Challenges; Enhancement Plan Development; Implications

1. Introduction

In the rapidly evolving landscape of contemporary business, the strategic use of big data analysis and business intelligence has become increasingly crucial for organizations aiming to thrive and gain a competitive edge. This research delves into the application and enhancement of these technologies within selected companies in Zhejiang, aiming to understand how they optimize business operations, improve decision-making processes, and ultimately drive overall business success.

Big data analysis involves extracting meaningful patterns and insights from large and complex datasets, both structured and unstructured. The selected companies in Zhejiang recognize the potential of big data analysis and are keen on exploring its application to drive success. By employing advanced analytics techniques such as data mining, machine learning, and predictive modeling, these companies can unveil valuable insights that were previously hidden, empowering them to make informed, data-driven decisions.

Business intelligence complements big data analysis by providing a framework and tools to transform raw data into actionable insights. Through technologies like dashboards, data warehouses, and reporting systems, organizations can gain a comprehensive view of their operations, monitor key performance indicators (KPIs), identify areas of improvement, and enhance overall business performance. In the context of the selected companies in Zhejiang, the application of these technologies can profoundly impact various aspects of their business, such as customer analysis, supply chain management, and operational efficiency.

Analyzing customer data enables companies to gain insights into preferences, personalize marketing campaigns, and enhance customer satisfaction. Integration of big data analytics with supply chain management allows optimization of inventory levels, streamlining logistics and improving overall operational efficiency. These examples underscore the potential benefits and competitive advantage that selected companies in Zhejiang can derive from leveraging big data analysis and business intelligence.

Despite the potential benefits, the implementation and utilization of these technologies can be complex and challenging. It requires integration of data from various sources, ensuring data quality and security, and developing robust analytical models. Organizational culture, skills gaps, and technological limitations can present additional hurdles. This research, therefore, focuses on selected companies in Zhejiang, a leading organization in its industry, to investigate current practices, challenges, and successes in utilizing these technologies.

The findings of this research contribute not only to the existing body of knowledge on big data analysis and business intelligence but also offer practical recommendations for organizations looking to leverage these technologies effectively. Understanding the

strategies, challenges, and successes of selected companies in Zhejiang provides valuable insights that can serve as a blueprint for other organizations in similar industries. Ultimately, this research aims to contribute to the growing field of big data analytics and business intelligence and assist organizations in harnessing the power of data to achieve their business objectives.

2. Methodology

The research is well-suited for a descriptive-quantitative research design. This design combines descriptive research, which focuses on describing and documenting characteristics and phenomena, with quantitative methods involving numerical data analysis. It enables systematic data collection through the distribution of survey questionnaires to gather quantitative data on the adoption, utilization, benefits, and implications of big data analysis and business intelligence in selected companies in Zhejiang. The design facilitates objective analysis by employing statistical techniques to explore relationships, patterns, and trends within the data. It aims to generalize findings to similar companies or industries, enhancing the study's applicability beyond selected companies.

2.1. Sampling Procedure

Purposive sampling was used in selecting the respondents of the study. This is employed to determine the sample population needed for the purpose of the research. A purposive sample is a non-probability sample that is selected based on the characteristics of a population and the objective of the study (Crossman, 2018). This sampling technique can be used in the study to select representatives of the company as respondents.

2.2. Respondents

The respondents of this research were 100 employees from five (5) different companies in the province utilizing big data analytics and business intelligence.

2.2.1 Research Site

Selecting Zhejiang, China as the locale for the study is justified due to its economic significance, diverse business landscape, and accessibility of data. Zhejiang's thriving economy with a wide array of industries provides an ideal setting to investigate the adoption and impact of big data analysis and business intelligence for gaining a competitive edge. Moreover, the region's strong government support for technological advancements and the presence of academic and industrial collaborations offers valuable insights for the research.

3. Results and Discussion

1. Profile of the Selected Companies in Zheijiang

The study categorizes participating companies into various sectors, with a focus on Healthcare, Finance, and Marketing. The analysis of the number of employees indicates a concentration on mid-sized to larger enterprises, with none having 30 or fewer employees. The majority (40%) have 91–120 employees, and another 40% have 121 or more employees, emphasizing a prevalence of moderate to large workforces.

Regarding the years of operation, the study examines five companies, all established for more than a decade. One company falls in the 16–20 years category (20% representation), while the remaining 80% have operated for 21 years or more. This highlights the stability, experience, and adaptability of the participating companies, essential factors for success in the competitive market landscape.

In terms of tools used, the study reveals diverse approaches to data analytics and business intelligence. While 20% invest in Company Developed tools and another 20% rely on Vendor-Based tools, 60% adopt a Combination of Both strategies. This underscores the contemporary need for flexible and tailored approaches to meet unique analytical requirements effectively among the participating companies.

2. Current level of adoption and utilization of big data analysis and business intelligence in the selected companies in Zheijiang.

The study reveals respondents' strong agreement (WM=3.67) on the system's proficiency in assessing diverse data sources, accuracy, collection methods, scale, and data generation speed, highlighting its capability for robust real-time analytics across various domains.

In terms of data storage and management, there is a strong consensus (WM=3.58) on the system's adept use of data warehouses and lakes, along with scalability. While respondents' express agreement (WM=3.25) on data security measures, slightly lower scores in areas like data ownership and metadata management still indicate a reasonable level of confidence.

Concerning integration with business processes, respondents express a high level of confidence (WM=3.60) in the system's seamless integration of diverse data sources. Strong agreement is seen in the use of APIs and connectors (WM=3.51), and respondents also agree (WM=3.58) on the system's automation capabilities and user empowerment.

Regarding the decision-making process, respondents strongly agree (WM=3.42) on the system's effectiveness in supporting data-driven decision-making through analytics tools. There is also strong agreement (WM=3.32) regarding the use of predictive models and machine learning. While there is agreement (WM=3.25) on the system's ability to define relevant metrics, a strong consensus (WM=3.33) suggests that the system learns from decisions and refines strategies over time, indicating a continuous improvement process.

3. Potential benefits and opportunities of big data analysis and business intelligence

The study indicates strong agreement (WM=3.58) among respondents that the system optimizes processes, reduces redundancies, and enhances operational efficiency, contributing to cost savings and resource optimization. While respondents agree (WM=3.25) on the system's role in resource allocation, there's a strong consensus (WM=3.60) on its effectiveness in promoting energy cost savings and sustainability. Additionally, respondents agree (WM=3.51) on the system's ability to optimize the supply chain and identify areas for waste reduction (WM=3.23).

In terms of customer targeting and segmentation, respondents strongly agree (WM=3.32) that the system effectively targets specific customer segments, improving conversion rates and sales (WM=3.67). They also believe in its role in maximizing customer lifetime value (WM=3.34) and driving cross-selling and upselling opportunities (WM=3.24). Strong agreement (WM=3.42) is observed regarding the system's use of customer feedback to enhance targeting and segmentation strategies.

Regarding competitive advantage, respondents agree (WM=3.24) that the system analyzes market trends, with a strong consensus (WM=3.58) on its effectiveness in comparing company performance against competitors. Respondents also agree (WM=3.25) on the system's contribution to developing

innovative products or services, and they strongly agree (WM=3.33) that it enhances customer experiences and provides swift responses to market shifts.

In terms of real-time monitoring and analytics, respondents strongly agree (WM=3.60) that the system provides speedy processing and real-time analytics, yielding quick results. There's a strong consensus (WM=3.34) on the system providing real-time alerts and promptly responding to critical events. While respondents agree (WM=3.24) on the system's contribution to predictive maintenance, they strongly agree (WM=3.42) that it effectively provides real-time analytics of ongoing operations and translates real-time data into actionable decisions promptly.

4. Implications of implementing big data analysis and business intelligence on the overall business strategy and competitiveness of Company

In the realm of strategic decision-making, respondents strongly agree (WM=3.58) that the system provides valuable insights for strategic planning and innovation. While there is agreement (WM=3.16) that the system aligns with long-term objectives and adapts to market changes (WM=3.33), there is room for improvement. Additionally, respondents agree (WM=3.25) that the system enhances sustainability and competitiveness, signaling potential areas for enhancement.

Regarding competitive advantage, respondents strongly agree (WM=3.60) that the system helps the organization differentiate itself and offers effective data-driven strategies for gaining market share (WM=3.51). While there is agreement (WM=3.15) on the system's role in customer loyalty, there is room for improvement. Respondents strongly agree (WM=3.32) that the system optimizes pricing and enables swift responses to competitive threats (WM=3.50).

In terms of operational efficiency, respondents strongly agree (WM=3.67) that the system significantly enhances operational processes and efficiently optimizes resource allocation (WM=3.34). While there is agreement (WM=3.16) on the system's role in task automation, there is room for improvement. Respondents strongly agree (WM=3.42) that the system effectively scales operations and assesses employee productivity.

Regarding risk mitigation, respondents strongly agree (WM=3.58) that the system effectively identifies and assesses various risks, supports crisis

management, and mitigates legal risks. While there is agreement (WM=3.25) on the system's role in providing early warnings based on data analytics and ensuring regulatory compliance, there is room for improvement. Additionally, respondents agree (WM=3.17) on the system's contribution to mitigating supply chain disruptions. These findings underscore the system's positive impact on strategic decision-making, competitive advantage, operational efficiency, and risk mitigation while also highlighting areas where further enhancements could be considered.

5. Weaknesses/challenges and threats of this technology business

In terms of data quality and integration, respondents strongly agree (WM=3.60) that the system maintains high data accuracy, crucial for correct analyses. They also agree (WM=3.51) on the system's role in data integration, acknowledging potential complexities. Furthermore, respondents agree (WM=3.67) that the system addresses data silos, improving data accessibility, and strongly agree (WM=3.34) on its effectiveness in ensuring data governance practices.

Regarding security and privacy, respondents strongly agree (WM=3.34) that the system maintains data security and adheres to compliance regulations. They also strongly agree (WM=3.58) on the system's ethical considerations and agree (WM=3.16) that it mitigates potential reputation risks from security breaches.

In the context of scalability and infrastructure, respondents strongly agree (WM=3.58) that the system addresses scalability challenges and effectively manages growing data volumes. They also agree (WM=3.25) on the system's ability to handle scaling costs and strongly agree (WM=3.60) on its capability to support evolving data analysis needs and manage storage costs.

Concerning the skills and talent gap, respondents agree (WM=3.23) that the system addresses the lack of data expertise but strongly agree (WM=3.67) on its effectiveness in training and upskilling employees. They also strongly agree (WM=3.27) on its role in recruitment and retention despite market competitiveness. Additionally, respondents agree (WM=3.25) on the system aiding collaboration across teams regarding data initiatives.

In addressing regulatory and compliance risks, respondents agree (WM=3.57) that the system manages challenges from changing regulations and strongly

agree (WM=3.51) on its effectiveness in identifying and mitigating legal liabilities. They also strongly agree (WM=3.24) on the system ensuring compliance with data retention policies and agree (WM=3.64) on its ability to comply with international regulations regarding cross-border data transfers. These findings highlight the system's positive impact on various facets of data management and governance, emphasizing its effectiveness in ensuring data quality, security, scalability, talent development, and regulatory compliance.

6. Strategic Plan

Strategic Plan 1 seeks to enhance data-driven decision-making by implementing advanced big data analysis tools over 12–18 months. This involves investments in analytics software, skilled analysts, employee training, and secure data infrastructure at all levels.

Strategic Plan 2 focuses on leveraging data insights for personalized marketing over 9–12 months, anticipating increased engagement and customer loyalty through customized campaigns. This plan involves the use of data mining tools, CRM software, and data scientists.

Strategic Plan 3 targets operational efficiency through data-driven optimization, aiming to reduce costs and enhance productivity across departments in 12–24 months. Implementation requires tools such as IoT devices, business intelligence software, and training programs for employees, along with change management experts.

4. Conclusions

1. The study reveals diverse sectors (Healthcare, Finance, Marketing) with mid-large companies operating for a decade, utilizing a mix of Company Developed and Vendor-Based data analytics tools, showcasing industry-wide adaptability.
2. Respondents strongly affirm the system's prowess in varied data assessment, real-time analytics, and seamless integration, supporting continuous refinement of strategies, predictive modelling, and informed data-driven decision-making.
3. The system demonstrates excellence in optimizing processes, enhancing efficiency, and ensuring energy cost savings. Its proficiency in customer

targeting, real-time monitoring, predictive maintenance, and efficient comparison against competitors underlines its strategic strengths.

4. The system provides invaluable insights for strategic planning and resource allocation, optimizing pricing, and mitigating risks. While competitive strategies are strong, adaptation to market changes and enhancing customer loyalty represent avenues for improvement.
5. The system excels in maintaining data accuracy, fostering integration, ensuring data governance, security, and compliance. It effectively manages scalability, infrastructure needs, skills gaps, and regulatory challenges, fostering collaboration across teams.
6. Strategic Plan 1 emphasizes enhanced decision-making through advanced tools and infrastructure investments, Plan 2 targets personalized marketing for increased engagement, and Plan 3 focuses on operational efficiency via data-driven optimization, reflecting comprehensive strategies for organizational growth and innovation.

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