

Study of Data Analytics Affecting Small and Medium Enterprises for Business Decisions

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Abstract: The purpose of this research is to investigate the influence that data analytics has on the decision-making processes of small and medium Enterprises (SMEs). For the purpose of decision-making, sixty percent of small and medium-sized enterprises (SMEs) employ data analytics, with fifty percent of them preferring descriptive analytics. Applications like as Excel, Google Analytics, and Microsoft Power BI are examples of common tools. In addition to having a favorable influence on customer service, sales, marketing, and financial management, data analytics also has a good impact on operations. However, small and medium-sized enterprises (SMEs) suffer problems owing to high initial expenses, a lack of knowledge, and difficulty in integration. According to the findings of the research, more efforts are required to overcome these hurdles and utilize the advantages of data analytics for the competitiveness of small and medium-sized enterprises (SMEs) and the overall performance of their businesses. Research that looked at the adoption of data analytics in one hundred small and medium-sized businesses (SMEs) found that there is a rising tendency towards data-driven strategies. The study found that sixty percent of SMEs are actively adopting data analytics for decision-making. Despite this, forty percent of organizations continue to avoid using analytics because of a lack of resources, a lack of competence, or an inadequate understanding. Descriptive analytics is the most widely used kind of analytics, with fifty percent of organizations depending on it for dashboards and reports. Excel and spreadsheets, Google Analytics, Microsoft Power BI, and Tableau are examples of common data analytics tools.

Keywords: Small and Medium-sized Enterprises (SMEs), Excel, Google Analytics, Microsoft Power BI.

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I. INTRODUCTION

Data analytics has emerged as a transformative tool in modern business environments, enabling organizations to extract meaningful insights from vast amounts of data and make informed strategic decisions. In recent years, small and medium-sized enterprises (SMEs) have increasingly adopted data analytics to enhance operational efficiency, improve customer satisfaction, and gain a competitive advantage in rapidly changing markets. Unlike large corporations, SMEs often operate with limited financial, technological, and human resources, making effective decision-making critical for their survival and growth (Brandy, 2023).

The proliferation of digital technologies, e-commerce platforms, social media, and cloud computing has generated substantial volumes of business data that can be analyzed to identify patterns, trends, and opportunities for improvement. Through data analytics, SMEs can better understand customer preferences, optimize inventory management, forecast demand, monitor financial performance and evaluate market conditions. These insights enable business owners and managers to make evidence-based decisions rather than relying solely on intuition or experience (Mosbah et al., 2023).

Furthermore, data analytics supports strategic planning by facilitating risk assessments, performance measurements, and resource allocations. Predictive and prescriptive analytics help SMEs anticipate future market developments, customer behavior, and operational challenges, allowing them to proactively respond to changes. The adoption of advanced analytical tools, including machine learning and artificial intelligence, has further expanded the potential of data-driven decision-making in small and medium-sized enterprises (Ocran et al., 2024).

Despite their numerous benefits, SMEs face several challenges in implementing data analytics, including limited technical expertise, high implementation costs, data quality issues, and concerns regarding data security and privacy. Therefore, understanding the impact of data analytics on business decision-making is essential for SMEs seeking sustainable growth, improved competitiveness, and long-term success in the digital economy (Bianchini & Michálová, 2019).

II. LITERATURE REVIEW

The growing importance of data-driven decision-making has encouraged researchers to examine the role of data analytics in enhancing the performance and competitiveness of small and medium-sized enterprises (SMEs). Recent studies indicate that data analytics has become a strategic resource that enables SMEs to improve operational efficiency, customer engagement, financial management, and business sustainability (Dechaprakrom & Ketmaneechairat, 2023).

Several studies have emphasized the positive relationship between data analytics adoption and organizational performance. Studies conducted in recent years suggest that SMEs utilizing data analytics tools achieve better decision quality by transforming raw business data into actionable insights. Data analytics assists managers in identifying market trends, understanding customer behavior, and optimizing business processes. Consequently, organizations are able to make more accurate and timely decisions, thereby reducing uncertainty in competitive business environments (Tichiwangana et al., 2024).

Recent literature also highlights the role of big data analytics in supporting strategic decision-making. Researchers have found that SMEs increasingly use customer transaction, social media, and operational data to forecast demand, improve product offerings,

and enhance customer satisfaction. Predictive analytics techniques enable businesses to anticipate future market conditions and customer preferences, allowing proactive decision-making rather than reactive responses (Ezeife et al., 2024).

Another significant area of research focuses on the integration of artificial intelligence (AI) and machine learning with business analytics. Recent studies have reported that AI-driven analytics systems help SMEs automate data processing, identify hidden patterns, and generate intelligent recommendations. These technologies improve decision speed and accuracy while reducing human errors. Furthermore, cloud-based analytics platforms have made advanced analytical tools more accessible and affordable for SMEs, facilitating wider adoption across various industries (Ikbal, 2025).

Researchers have also examined the impact of data analytics on financial decision-making. Studies have indicated that analytical tools support budgeting, cash flow management, risk assessment, and investment planning. By analyzing historical and real-time financial data, SMEs can identify potential risks and opportunities, thereby improving their financial stability and profitability. Similarly, supply chain and inventory management have benefited significantly from analytics-based forecasting models, which help reduce operational costs and minimize stock shortages or excess inventories (Baranidharan et al., 2025).

Despite these benefits, the literature identifies several barriers to effective data analytics implementation in SMEs. One of the most frequently reported challenges is the lack of technical expertise and skilled personnel capable of managing analytical systems. Many SMEs face difficulties recruiting data scientists and analytics professionals because of financial constraints. Data quality issues, including incomplete, inconsistent, and inaccurate data, further limit the effectiveness of analytical models (Justy et al., 2023).

Cybersecurity and data privacy concerns represent additional challenges highlighted in recent studies. As SMEs increasingly rely on digital platforms and cloud services, protecting sensitive business and customer information has become a critical concern. Researchers emphasize the need for robust data governance frameworks and security measures to ensure the safe and ethical use of business data (Vij, 2025).

The recent literature concludes that data analytics significantly enhances business decision-making capabilities in SMEs by providing accurate, timely, and evidence-based insights. However, successful implementation requires investments in technology, employee training, data management practices, and organizational readiness. Future research is expected to focus on AI-powered analytics, real-time decision support systems, and industry-specific analytical frameworks that can further improve SME performance and competitiveness in the evolving digital economy (Ikbal, 2025).

III. RESEARCH QUESTIONS

RQ1. To what extent do Small and Medium Enterprises (SMEs) adopt data analytics in their business decision-making processes?

RQ2. How does the use of data analytics influence the quality and effectiveness of business decisions made by SMEs?

RQ3. What are the key benefits that SMEs experience from implementing data analytics?

RQ4. What are the main challenges and barriers faced by SMEs in adopting and utilizing data analytics?

RQ5. Which data analytics tools and techniques are most commonly used by SMEs, and how suitable are they for their needs?

RQ6. How do internal factors (such as technical expertise and organizational readiness) and external factors (such as market conditions) affect the adoption of data analytics in SMEs?

IV. METHODOLOGY

The present study adopts a mixed-method research design to examine how data analytics affects business decisions in Small and Medium Enterprises (SMEs). The study focuses on understanding the role of descriptive, predictive, and prescriptive analytics in improving decision-making, operational efficiency, profitability, customer insights, and competitiveness among SMEs.

Primary data will be collected through surveys, questionnaires, interviews, and focus group discussions with SME owners, managers, and decision-makers. The survey will include both closed-ended and

open-ended questions related to data analytics adoption, business performance, challenges, and perceived benefits. Interviews and focus groups will provide deeper qualitative insights into how SMEs use analytics in areas such as marketing, finance, operations, supply chain, and customer service.

Secondary data will be gathered from industry reports, case studies, government publications, organizational reports, and research articles to support and compare the primary findings. The study may use stratified random sampling to represent SMEs from different sectors, sizes, and locations, while purposive sampling may be used for interviews with experienced SME decision-makers.

Quantitative data will be analyzed using descriptive statistics, correlation, regression, t-test, ANOVA, and factor analysis. Qualitative data will be examined through thematic, content, and narrative analysis. Ethical considerations such as informed consent, confidentiality, anonymity, and the right to withdraw will be maintained throughout the study.

V. RESULTS AND DISCUSSION

When it comes to business, data analytics is an important tool since it offers insights that lead to improved strategy, more efficiency, and better results. The ability to make educated decisions, improve operational efficiency, enhance customer insights, and provide a competitive edge are all benefits that may be generated by this. Businesses are able to get a better understanding of patterns, consumer preferences, and possible dangers via the analysis of historical data, which ultimately results in judgments that are more accurate and dependable. In addition, data analytics assists in the identification of inefficiencies and bottlenecks within operations, which enables firms to simplify processes and decrease costs.

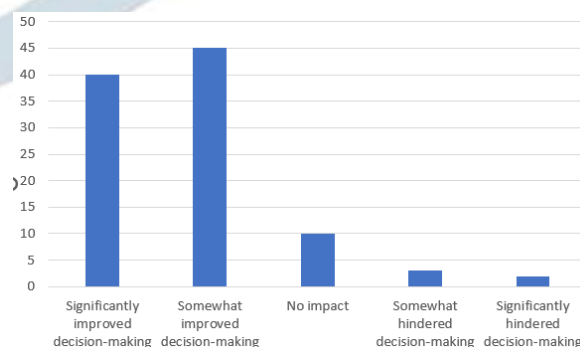


Figure 1: Bar chart for responses about “In your opinion, how has data analytics affected the overall decision-making process in your business?”

Data analytics has had a generally positive impact on the decision-making process in SMEs, with a significant majority (85%) of respondents experiencing some degree of improvement, either minor or substantial. However, a small portion of businesses found it challenging to fully leverage data analytics, highlighting potential barriers in data complexity or integration.

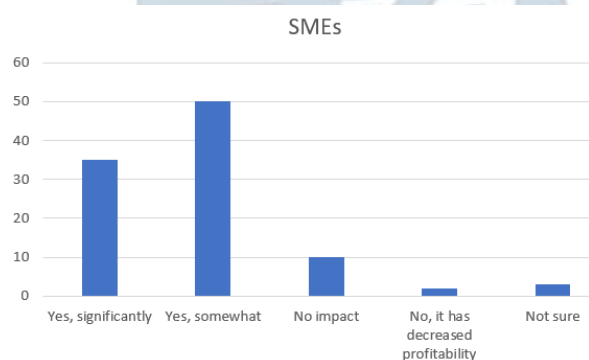


Figure 2: Bar chart for responses about “Has data analytics improved your business's profitability?”

A majority of SMEs (85%) reported that data analytics has either somewhat or significantly improved their profitability. However, a small proportion of businesses (2%) have experienced negative effects, indicating that the implementation of data analytics needs careful consideration and strategy to be truly beneficial.

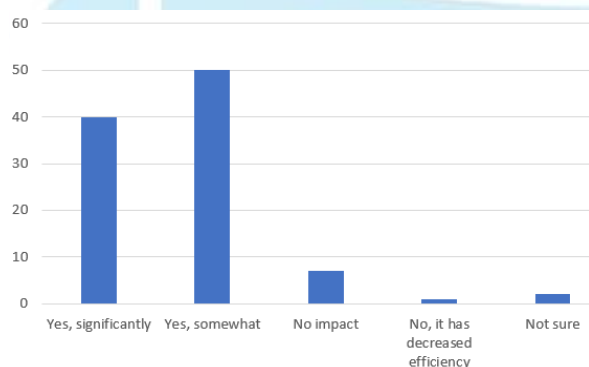


Figure 3: Bar chart for responses about “Has data analytics helped you to improve operational efficiency (e.g., reducing costs, improving productivity)?”

The majority of SMEs (90%) found that data analytics has improved operational efficiency in some capacity,

with 40% reporting significant improvements. However, a small percentage (1%) faced challenges in utilizing data analytics effectively, which led to a decrease in efficiency.

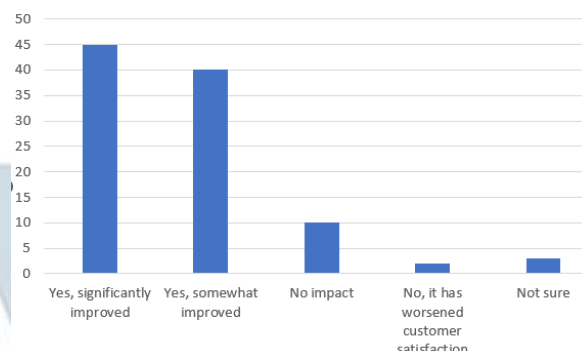


Figure 4: Bar chart for responses about “Has data analytics influenced your business's customer satisfaction?”

The majority of SMEs (85%) reported that data analytics has had a positive impact on customer satisfaction, either significantly or somewhat. However, a small number of businesses (2%) noted that it had worsened customer satisfaction, suggesting that a balanced approach to data usage is necessary to maintain a positive customer experience.

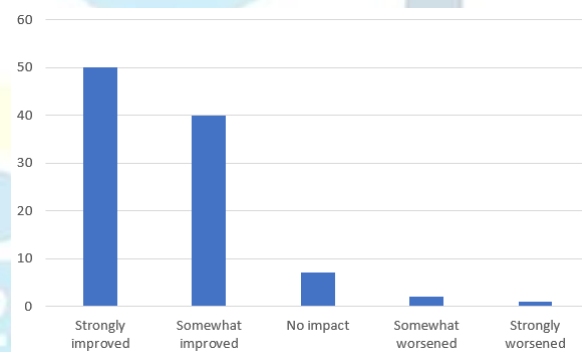


Figure 5: Bar chart for responses about “To what extent has data analytics improved your ability to forecast future trends or demand in your industry?”

The majority of SMEs (90%) reported that data analytics has positively impacted their ability to forecast future trends and demand, with 50% experiencing strong improvements. However, a small portion (3%) of businesses found that the complexity of data analytics has made forecasting more challenging, highlighting the importance of having the right tools and expertise.

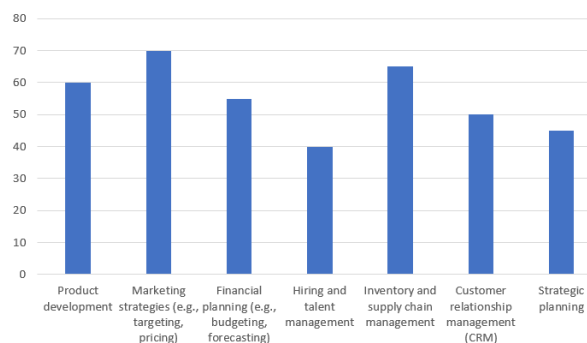


Figure 6: Bar chart for responses about “What specific business decisions have been positively impacted by data analytics? (Select all that apply)”

The most significant impacts of data analytics have been seen in marketing strategies, inventory and supply chain management, and product development, all of which are key areas for driving growth and efficiency in SMEs. While other areas like hiring and talent management and strategic planning have seen positive impacts, they are less pronounced compared to other business decisions.

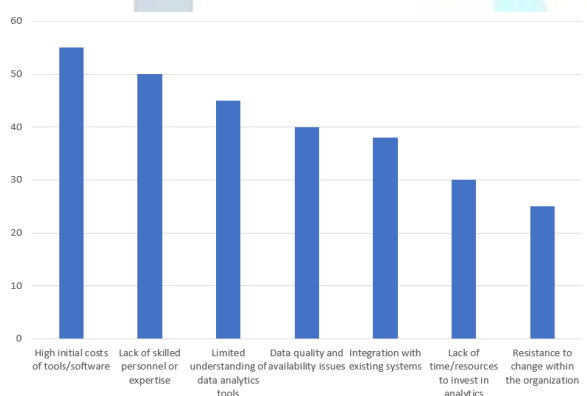


Figure 7: Bar chart for responses about “What challenges or barriers has your business faced in adopting data analytics tools?”

The major challenges for SMEs in adopting data analytics are related to cost (high initial investment) and lack of expertise. Addressing these barriers would require a combination of training, financial planning, and fostering a culture of change within organizations.

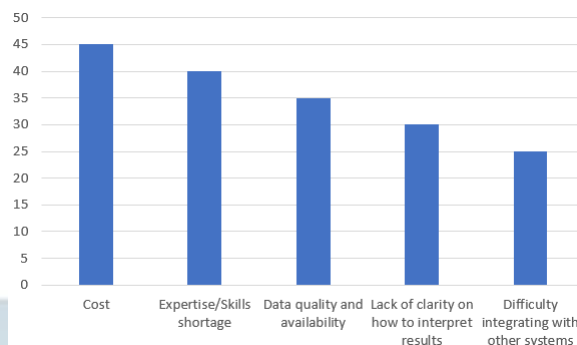


Figure 8: Bar chart for responses about “What has been the most significant challenge in using data analytics for business decisions in your company?”

The most significant challenge for SMEs in adopting data analytics is the cost of tools and software, followed closely by a shortage of expertise. Addressing these issues through training, budget planning, and better data management could help SMEs make more effective use of data analytics in their decision-making processes.

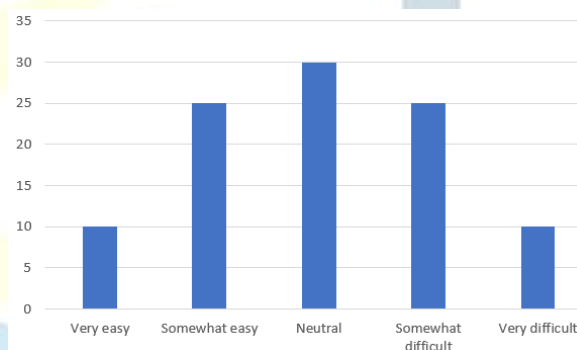


Figure 9: Bar chart for responses about “How would you rate the ease of implementation and integration of data analytics in your business?”

For most SMEs (65%), the implementation and integration of data analytics was either neutral or somewhat easy, while 35% found it to be more challenging. The difficulties stemmed primarily from issues with integration, lack of expertise, and resource limitations.

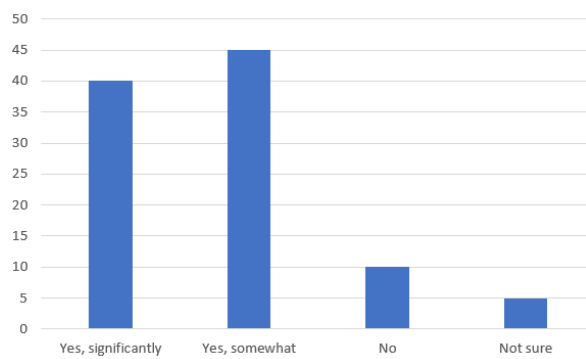


Figure 10: Bar chart for responses about “Do you plan to increase your business's use of data analytics tools in the future?”

The majority of SMEs (85%) plan to increase their use of data analytics tools in the future, either significantly or somewhat. This indicates a growing recognition of the value of data analytics for business growth, though a small portion of businesses remain unsure or do not plan to expand its use.

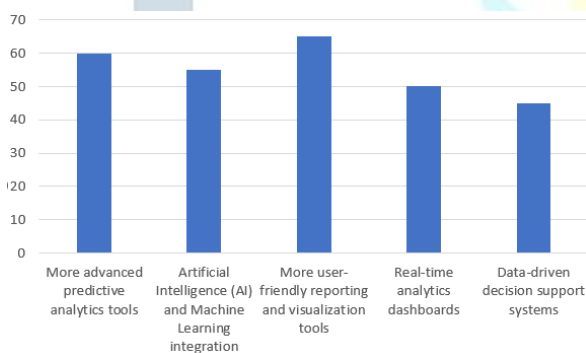


Figure 11: Bar chart for responses about “What types of data analytics tools or capabilities would you like to implement in the future? (Select all that apply)”

The most desired data analytics tools for SMEs in the future are user-friendly reporting and visualization tools, followed by advanced predictive analytics tools and AI/ML integration. This shows a strong demand for tools that simplify data interpretation and enable proactive decision-making with real-time insights.

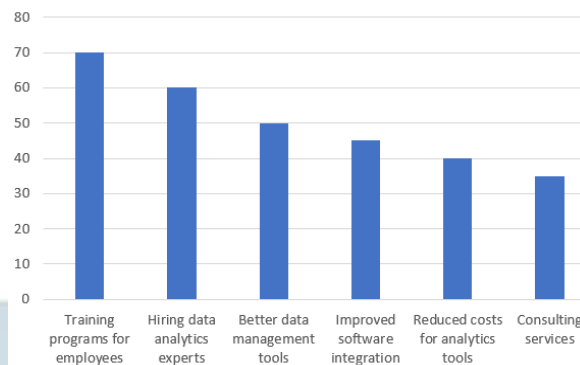


Figure 12: Bar chart for responses about “What additional resources or support would help your business improve the use of data analytics for decision-making?”

The most crucial resource needed by SMEs to improve their use of data analytics is employee training, followed by the need to hire data analytics experts. Addressing these needs, along with improvements in data management and software integration, could significantly enhance the adoption and effectiveness of data analytics for decision-making in SMEs.

VI. CONCLUSION

The study concludes that data analytics plays an important role in improving business decision-making among Small and Medium Enterprises (SMEs). The findings show that many SMEs are gradually shifting from intuition-based decisions to data-driven strategies. Around 60% of SMEs use data analytics for decision-making, mainly in sales, marketing, financial management, operations, supply chain, and customer service. Descriptive analytics is the most commonly used method, while predictive and prescriptive analytics are still developing. Tools such as Excel, Google Analytics, Power BI, and Tableau help SMEs understand customer behavior, forecast sales, improve inventory control, manage finances, and enhance operational efficiency. However, some SMEs still face challenges such as lack of expertise, limited resources, poor data quality, high implementation cost, and weak technological infrastructure.

The future scope of the study can be expanded by including more SMEs from different industries, regions, and business sizes. Future research may focus on the use of artificial intelligence, machine learning, predictive analytics, and cloud-based analytics in SME decision-making. Further studies can also examine data privacy, data governance, long-term business

performance, and the role of data-driven culture in improving SME competitiveness and sustainable growth.

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