AI-Powered Business Intelligence for small and New Enterprise

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Abstract

Many small and newly established businesses play a crucial role in the global economy, yet they often lack access to advanced tools that support decision-making. Without proper business intelligence systems, these enterprises can find it difficult to respond quickly to market changes or understand what their customers truly need. Relying on spreadsheets or simple dashboards may help to some extent, but these tools rarely offer the depth or immediacy required in today's competitive environment. To address this challenge, we've developed BizEye, a user-friendly, AI dashboard built specifically for small businesses. It brings sales figures and customer feedback in one place, offering clear, real-time visuals and insights that help business owners take smarter actions, faster. By acquring natural language processing (NLP) for sentiment analysis and leveraging AI-driven business analytics, the system enhances product performance tracking, customer profiling, and decision-making processes. The platform empowers small businesses to detect early issues, understand customer needs, and adapt strategies accordingly. This paper presents the design, implementation, and potential impact of BizEye, illustrating how AI can be a transformative force for small-scale business intelligence.

Keywords:
Artificial Intelligence • Business Intelligence • SMEs • Sentiment Analysis • NLP • AI Dashboards • Real-time Analytics • Customer Insights • Predictive Analytics • Data Visualization

Introduction

Small and new enterprises play an important role in the economy by driving innovation, employment opportunities, and delivering localized services. Despite playing a crucial role in the economy, many small businesses still operate without the access to advanced tools that supports strategic movements, data-driven decisions. Instead, they frequently rely on simple spreadsheets or limited dashboards, which lack the analysis depth that is needed to understand real-time customer behavior, shifting the market trends, or internal operational of the issues.

As a result, these businesses struggle to identify why certain products under perform, how to understand customer feedback, or which issues require quick attention. While traditional business intelligence (BI) systems offer powerful features and capability, they're too expensive or difficult for smaller organizations or business to adopt. These systems rarely include modern features like customer sentiment analysis or predictive insights for the system, both of which are increasingly essential in the economy.

Reviewing the customer data and trends of the sale stays common but is time-consuming, prone to error, and frequently misses deeper patterns that could lead with better decisions. This is where artificial intelligence (AI),

particularly natural language processing (NLP) and machine learning, can make a real difference for the businesses. These technologies allow businesses to analyze text data, interpret and lead to proper outcome that bridging the information gap small enterprises frequently face.

AI dashboards, in particular, can improve how small and new businesses operate. By bringing the real-time sales of the data, customer reviews, and market trends into user-friendly interface in the system, these tools offer accurate and actionable insights. Our solution, BizEye, is designed with these needs in mind that it's cost-effective and can be employed by many enterprises and the AI platform that gives small, growing and new businesses real-time visibility in form of product performance and customer sentiments. With BizEye, decision-makers can gain access to smart insights that help with strategy, improve operations, and boost customer satisfaction, all of which contribute to long-term, sustainable growth of the business.

Literature Review

Many high-tech and large companies have benefitted from artificial intelligence, meanwhile, small and medium-sized businesses still run into several problems. They often don't have enough data, their infrastructure is limited, and the cost of using AI in their workflows can be too high. A review of past research pointed out that 27 barriers that make it harder for SMEs to adopt AI, that was covering everything from social issues to financial and technical problems. This shows there's a real need for better support for the small and medium enterprises like funding options, expert help, and tools that actually fit the way SMEs operate.

This also highlights a pressing need for tailored support, like affordable funding, expert consulting, and the AI tools that is specifically built with SMEs in mind and to truly benefit from AI, smaller and medium businesses require solutions that fit their budgets and workflows.

This research also investigates the primary factors which drives the employing of artificial intelligence in e-commerce by small and medium-sized enterprises (SMEs), that is aiming to fill a gap in the current academic literature. A study was based on data from SMEs in Saudi Arabia found that dynamic capabilities and entrepreneurial orientation are major fundamental factors that help businesses successfully employ AI. Using structural equation modeling, the research shows that adopting AI doesn't just modernize operation, it also actually boosts the overall performance of these businesses. This gives entrepreneurs, business owners and decision-makers a clear direction for building smarter, AI-driven strategies.

Another study was focused on how AI helped SMEs track tough times during the COVID-19. It surveyed 317 SMEs in London using a new 10-point scale and found that AI tools, especially in marketing, cash flow forecasting, and HR management, it played a huge role in reducing risks during the COVID-19 crisis. The results made one thing clear: AI gives small businesses the flexibility and resilience they need to adapt fast, overcome and face challenges, and work more efficiently and effectively. It's not just about tech, it's about survival, growth, better product and staying ahead in a changing world.

The study explores the high potential of AI applications to mitigate business risks faced by SMEs during crises such as the COVID-19 pandemic. By utilizing 10-item scale and data from 317 SMEs in London, the research found that AI tools used in marketing, cash flow forecasting,

and human resources played a significant role in reducing risks related to the pandemic. The results indicate that AI strengthens SMEs' dynamic capabilities, allowing them to respond quickly, adapt to changing demands, and improve operational efficiency.

This study emphasizes how AI sentiment analysis improves the competitive research by understanding emotions and tone in the text data. It helps SMEs get deeper insights into market trends and customer perceptions of competitors. Literature from 2012 to 2022 shows that such tools support more informed and strategical business

decisions.

This systematic review investigates the adoption of Big Data (BD) within SMEs, emphasizing its beneficial effects on operational efficiency, revenue growth, and competitive advantage. By analyzing 93 studies conducted between 2014 and 2024, the review highlights key factors driving adoption as well as barriers such as financial constraints and technical challenges. Although BD demonstrates significant promise in improving SME performance, the review points out a predominant reliance on quantitative methods, underscoring the need for more varied research approaches to gain a complete or inclusive understanding of BD's influence.

This study investigates that integrating the predictive modeling and sentiment analysis within Marketing 5.0, shaped by the emergence of AI, Big Data, and IoT in the context of Society 5.0. Through a systematic review of existing literature, it underscores the value of a sentiment-driven predictive approach in improving customer experiences and informing marketing strategies. The findings highlight how these models assist businesses in personalizing products, delivering targeted advertisements, and enhancing decision-making across the entire buyer's journey.

This study highlights how Artificial Intelligence (AI) transforms marketing by personalizing customer experiences and optimizing content delivery. Using data and algorithms, AI supports real-time targeting, competitor analysis, and better decision-making. It also emphasizes Machine Learning's role in improving data insights and campaign results. Reviewing diverse academic sources, the study outlines key AI applications and their impact on marketing practices.

This study analyzes factors influencing Business Intelligence (BI) implementation, comparing traditional and self-service models using system dynamics. Findings from expert interviews and literature show both start with similar acceptance, but self-service reaches 30% higher acceptance after 60 months. The study stresses strategic planning and offers recommendations to boost BI adoption for competitive advantage.

Comparative Analysis

Sr. No	Authors	Application	Methodology	Database	Evaluation Metrics	Performance
1	Mehrdad Maghsoudi, Navid Nezafatib	Implementing business intelligence in organizations	System dynamics modeling, interviews with five BI experts, literature review	Relies on "vast amounts of data"	Not explicitly mentioned	Focuses on understanding key factors for successful BI implementation
2	HUANG HUANG, ADELEH ASEMI, Mumtaz Begum Mustafa	Sentiment Analysis in E-commerce Platforms	Review of current techniques, deep learning algorithms (RNN, attention mechanisms)	Implicitly, comments and reviews from e-commerce platforms; mention of creating a benchmark	Not explicitly mentioned	Identifies hidden emotions in text, useful for e-commerce, aims for more fine-grained sentiment analysis

				dataset		
3	Samuel Omokhate Yusuf, Godbless Ocran, Peprah Owusu, Enis Agyeman Boateng, Sylvester Obeng Krampah, Adedamola Hadassah Paul-Adeleye	AI-driven business analytics for SMEs: unlocking value through predictive and prescriptive analytics	Review article; suggests predictive analytics techniques in consumer behavior	Not explicitly mentioned	Not explicitly mentioned	Aims to unlock value for SMEs through predictive and prescriptive analytics
4	Mahmoud SalahEldin Kasem, Mohamed Hamada, Islam Taj-Eddin	Customer profiling, segmentation, and sales prediction using AI in direct marketing	K-means clustering algorithm, Elbow method, Silhouette coefficient, Gap Statistics method; RFM (recency, frequency, and monetary) analysis	Customer data for profiling, segmentation, and sales prediction	Elbow method, Silhouette coefficient, Gap Statistics method	Unveils three distinct customer segments (new, best, intermittent customers); crucial for tailored content and re-engagement strategies
5	Nick Drydakis	Artificial Intelligence and Reduced SMEs' Business Risks during the COVID-19 Pandemic	Dynamic Capabilities Analysis, uses International Labor Organization's SMEs COVID-19 pandemic business risks scale, new 10-item scale for AI applications	Data collected from SMEs in London (April-June 2020)	Not explicitly mentioned, but determines association with reduced business risks	AI applications are associated with reduced business risks for SMEs; boost sensing and seizing capabilities
6	Mpho Kgakatsi, Onthatile P. Galeboe,	Impact of Big Data on SME Performance, focusing on	Systematic Review of 93 research papers (2014-	93 research papers published between 2014	Evaluates drivers and barriers of BD	Big Data adoption in SMEs significantly

	Kopo K. Molelekwa, Bonginkosi A. Thango	business improvement, economic performance, and revenue growth	2024) using PRISMA framework; quantitative, case studies, mixed-method, and qualitative studies	and 2024	adoption and its overall impact	improves operational efficiency, revenue generation, and competitiveness
7	Abid Haleem, Mohd Javaid, Mohd Asim Qadri, Ravi Pratap Singh, Rajiv Suman	Artificial Intelligence (AI) applications for marketing (digital marketing, consumer behavior, targeted ads)	Literature-based study; discusses AI processing large amounts of data	Implicitly, large amounts of data from social media, emails, and the Web	Not explicitly mentioned	AI aids in data proliferation, improves software data management, enables advanced algorithms; helps marketers with real-time customer needs and personalized experiences
8	Hamed Taherdoost, Mitra Madanchian	Artificial Intelligence and Sentiment Analysis in Competitive Research	Review of papers (2012-2022); AI used to recognize emotions and tone in text	Not explicitly mentioned, but focuses on text data	Not explicitly mentioned	AI has improved sentiment analysis performance; helps in understanding competitor perception
9	Soliman Aljarboa	Factors that influences and motivates the adoption of artificial intelligence (AI) in e-commerce by SMEs	Empirical data from digital survey of SMEs in Saudi Arabia; Structural Equation Modeling (SEM)	Data the online survey of SMEs in Saudi Arabia	R2 = 0.65 for business performance	AI adoption significantly enhances business performance of SMEs, facilitated by dynamic capabilities and entrepreneurial orientation

10	Mohamad Deeb Abdul Wahab, Mehrshad Radmehr	Impact of AI assimilation on firm performance in SMEs	Moderated multi-mediation model; 417 responses from SMEs in Lebanon; dynamic capability view	417 responses from SMEs in Lebanon	Beta (β) and Standard Error (SE) values (e.g., β = 0.080, SE = 0.032)	AI assimilation positively impacts organizational outcomes and yields performance benefits for SMEs, with mediating roles of absorptive capacity and customer agility, and moderating role of organizational agility
11	Badghish S & Soomro, Y. A.	Examining of the AI adoption in (SMEs) focusing on sustainable business performance.	Quantitative study using the TOE framework and the structural modeling	Survey responses and data collected from the SME firms	This Includes model fit measures and statistical analysis	Finds that tech readiness and external pressure drive AI use & business sustainability
12	A. Bettoni, D. Matteri, E. Montini, B. Gladysz, E. Carpanzano	This suggests a structured model to guide SME AI adoption	The conceptual model based on the past research and industry insights of the system.	None and purely theoretical	Not applicable due to the conceptual nature	It offers a key areas to focus on during AI integration of the system.
13	A. Hussain, R. Rizwan	Provides strategy-oriented framework for SMEs to adopt AI	Framework built on the strategic management principles	No data used; model is advisory	Not specified	This aims to help SMEs align AI with long-term goals and the operations
14	Ferdous Jahan, Sutapa Chowdhury, Md. Amdadul Hoque	This Investigates the impact of AI adoption and green leadership on environmenta	The Quantitative study utilizing Smart PLS-SEM analysis on survey data from 266 SME respondents.	Preliminary data gathered through structured questionnaire s targeting SMEs across	Employed statistical measures such as path coefficients and significance	Findings indicate that both AI and green leadership positively motivates the

		l performance of SMEs in Bangladesh.		many sectors in Bangladesh.	levels to validate hypotheses.	green investment and environmental performance,
15	Constantin-Marius Apostoaie, Teodora Roman, Alexandru Maxim, Dumitru-Tudor Jijie	Explores the factors that is influencing the intention to adopt AI technologies among Romanian SMEs. framework.	The Combined factor analysis and partial least squares structural equation modeling.	The Survey data that is collected from Romanian SMEs across from various industries.	Analysis of model fit indices and the path coefficients to determine proposed relationships.	This study identifies leadership, organizational readiness, and external pressures (from competitors and the customers) as AI adoption intention, while highlighting the challenges such as limited digital skills and unclear benefits.

Conclusion

Artificial Intelligence (AI) has greatly enhanced business intelligence by enabling data-driven decision-making. However, small and new businesses often face challenges accessing these benefits due to the cost, complexity, and technical demands of traditional AI tools. While research in customer segmentation, predictive analytics, and sentiment analysis shows promise, most solutions target larger companies with more resources. The BizEye project addresses this gap by offering a web-based platform designed for small enterprises. It combines AI techniques such as natural language processing for customer sentiment and machine learning for product tracking, providing simple, real-time dashboards that convert data into actionable insights. BizEye helps business owners identify problems early, understand customers better, and make quicker, informed decisions.

Unlike existing tools, it is affordable, user-friendly, and prioritizes privacy and scalability. This project adapts advanced AI methods to support the growth and flexibility of smaller businesses, making sophisticated analytics accessible to those who need it most.

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Figures and Tables

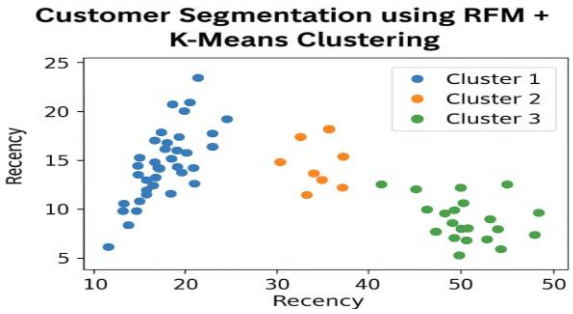


Figure-1.0

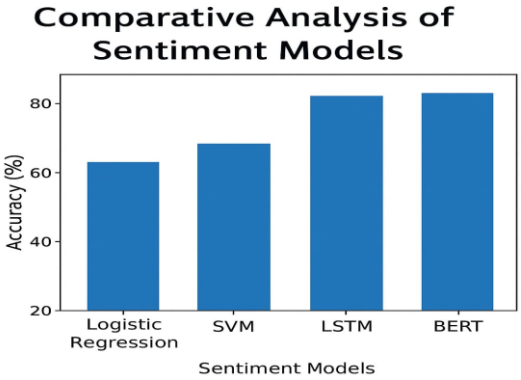
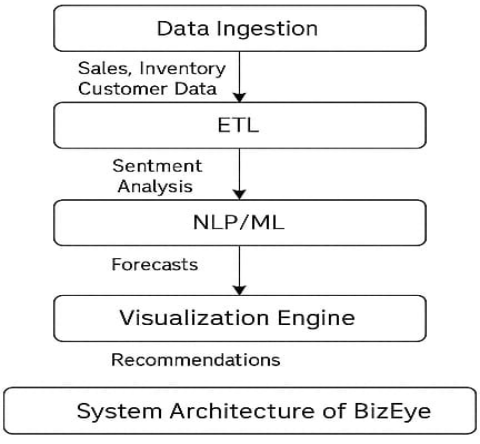


Figure-1.1



System Architecture of BizEye

Figure-1.2

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