Original Article

Role of Real-Time Data Analytics in Driving Business Innovation

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ABSTRACT

This study examines the pivotal role of real-time data analytics in enhancing business innovation. It investigates the relationship between real-time data availability, the adoption of analytics tools, and market responsiveness, and how these factors collectively contribute to organizational innovation. Data were collected through a structured survey questionnaire distributed among employees in the food industry, a sector where timely information is critical for strategic decision-making and operational efficiency. The responses were analyzed using SPSS software, employing robust statistical techniques to evaluate the relationships between the independent variables and innovation as the dependent variable. The results indicate a significant positive relationship, demonstrating that organizations that effectively utilize real-time data and advanced analytics are better positioned to respond to market dynamics and emerging opportunities. These findings underscore the importance of integrating real-time analytics into organizational processes, enabling businesses to foster innovation, improve competitive advantage, and achieve sustained growth in rapidly changing market environments. Future research can discover the prolonged effects of analytics adoption on innovation in different industries.

Keywords: Analytics tools, Business innovation, Operational efficiency, Real-time data analytics, Strategic decision-making

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INTRODUCTION

In recent years, companies have been able to achieve competitive advantage and innovation through information systems. Data and business capabilities specifically are being emphasized as crucial contributors in generating innovation (Yoshikuni, 2023). Brynjolfsson and McAfee (2019) stated that firms that are data-driven are typically 6% more profitable and 5% more productive than their competitors (Aktaş, 2022). To cater to opportunities accessible through technology and changing customer preferences, businesses need to innovate themselves (Duan, 2020). The increasing availability of data regarding customers, providers' rivals and associates, and businesses is driving the use of macro-level analytics to inform decisions. It includes the utilization of operational data that is a collateral outcome of implementing the business's information systems. This type of data is increasing rapidly; it can provide inclusive data about consumer behavior in real time, such as people's activities, locations, site usage, and keyword explorations, which leads to excluding the requirement to perform different censuses. The data are more valuable when combined, giving an exceptional opportunity to influence business decisions and innovation (Wu, 2020).

Literature revealed that businesses should act rapidly to get an advantage from big data analytics and should utilize it to attain innovation and a competitive edge. Among the numerous subfields, word analytics is included in business analytics and data analytics, which both aid in business problems (Mazher, 2024). Both analytics are opportunities for companies to transform their current practices. According to a study, the significance of real-time analytics is to give retailers a competitive advantage by assisting them in responding quickly to market changes plus consumer demands (Raji, 2024).

Moreover, the application of real-time analytics in businesses is crucial for staying competitive in the global market (Varma, 2020). Apple, Facebook, Google, and other businesses are using data analytics to examine primary and secondary datasets and recognize insights based on patterns and correlations. These processes help firms to recognize market, customer, and competition requirements to innovate, maintain, and achieve sustainable innovation and competitive advantage (Yoshikuni, 2023). Retail giants, for instance, Walmart and Amazon, have utilized real-time data analytics in their businesses to perform targeted marketing campaigns, improve pricing approaches, and proficiently manage their inventory (Raji, 2024).

The existing studies have focused on customer and marketing analytics and statistical processes (Batistič, 2019). Technological development, big data analytics, and other emerging technologies let businesses collect data that can be helpful to get direction for innovation, and they have an important influence on innovation (Babu, 2024). Application of data analytics was majorly focused on specific domains such as logistics, supply chain, and other business areas (Gupta, 2019).

The dynamic capability theory (DCT) suggests that businesses construct, integrate, and restructure their in-house and external resources and competencies to efficiently transform their operational processes to analytically innovate their approach to doing things and adapting to changes in the market. DCT has been established as a postponement to the resource-based view (RBV) to explain the fundamental causes and process of how organizations can be more innovative in response to the swift changes in the business market (Kumar, 2016). To enable innovation, DCT ultimately promotes new concepts within the organization by combining abilities, data, technologies, and expertise to create revenue-generating products and services (Braganza, 2017). The significance of DCT is that it allows businesses to innovate continuously in environmental risks, which are observed as a significant dynamic in the present period of data-driven technology. In the data-driven environment, data analytics is viewed as a significantly valued resource that will be crucial to execute innovation that has implications for the business's competitive edge (Kumar V. D., 2016).

In this study, DCT can be utilized to interpret how real-time data availability, market responsiveness, and analytics adoption facilitate businesses to innovate constantly and efficiently in response to prompt market changes. This framework supports the hypothesis that real-time data analytics can enhance an organization's dynamic abilities, leading to higher levels of innovation. By linking DCT with real-time data analytics, it can show how businesses can vigorously adapt their strategies and processes to foster understandings, supporting

Figure 1 - Theoretical Framework
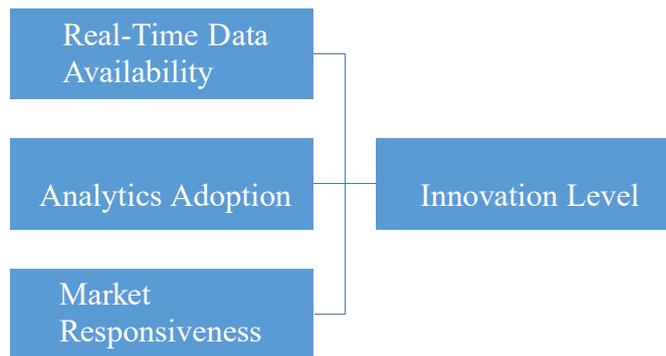
innovation and competitive advantage. This supports the theoretical framework by linking it to an established theory that validates the importance of adaptability and data application in business innovation. High-quality, real-time data availability enables businesses to make timely, informed decisions, which can result in innovative practices (Nam, 2019). Data-driven decision-making has become well-known due to data availability.

Brynjolfsson et al. (2011) is considered the first large-scale study on the impact of using data to make decisions and found substantial returns produced by the adoption of data-driven decision-making practices (Wu, 2020). Empirical findings by Davenport (2017) revealed that organizations with access to real-time data cultivate a culture of agility, where cross-functional teams collaborate to drive innovative ideas. The availability of up-to-date information eliminates bottlenecks and encourages iterative innovation processes. Correspondingly, Saunders and Tambe (2013) found that businesses that are more concentrated on data usage at a management level have higher productivity and market valuations. Analysis of manufacturing businesses utilizing Census data also demonstrates that the speedy adoption of data-driven decision making relates to increased productivity (Brynjolfsson, 2016). Streaming analysis in real-time data is becoming the most effective way to acquire beneficial knowledge from what happens now, allowing businesses to respond quickly when complications appear or to detect new trends that help improve their performance (Aktaş, 2022). All the prior research shows a positive relationship between real-time data availability and innovation level.

Relationship between Market responsiveness and Innovation level

Businesses express care to their customers and simply ask customers why they end up being continuous followers (Bodlaj, 2010). Market responsiveness is defined as a business competency that allows a business to respond rapidly to changing market demands. Responsive organizations are able to transform swiftly to varying environmental conditions (Garrett R. P., 2009). According to Narver (2004), a responsive market refers to discovering, understanding, and satisfying customer needs. Both market orientations and responsiveness must be the basis of a business's innovation efforts (Bodlaj, 2010).

Dynamic Capability Theory highlights a business's capability to reconfigure resources to address rapidly changing market trends, which is mainly applicable for attaining and sustaining a market edge. Businesses' market responsiveness and innovation level can be enhanced by leveraging data analytics. Agility is emphasized as a critical factor that enables firms to respond rapidly to unanticipated market shifts. Teece (2010) explains agility as the firm's capability to reorganize resources concerning high-value activities in response to both internal and external forces. Market responsiveness is seen as fundamental for businesses to sustain competitiveness in fast-moving markets (ZareRavasan, 2023).

Recent research conceptualizes agility in three main dimensions: sensing, decision-making, and acting agility. Sensing agility includes congregation and analyzing market information to predict competitive chances, while decision-making agility allows organizations to analyze this data to make timely decisions. Acting agility discusses immediate implementation of strategies and activities, such as new products or pricing models, to tap into identified opportunities (Park Y, 2017). Zehir & M (2019) explored the

relationship between market orientation, collaborative competition, innovation competencies, and organizational performance. They concluded that strong market responsiveness positively impacts innovation capabilities, thereby enhancing firm performance.

Relationship between Analytics Adoption and Innovation Level

Empirical studies have constantly revealed a positive relationship between analytics adoption and innovation levels in businesses. Alghamdi (2023) found that integrating data analytics significantly enhances a firm's tactical agility and innovation performance. The research also highlighted that strategic agility facilitates this relationship, suggesting that analytics adoption enables firms to swiftly adapt and innovate in dynamic markets. Analytics adoption includes data-driven tools and approaches to examine large-scale data, draw valuable insights, and make well-grounded decisions. Analytics adoption is likely to positively impact innovation by enabling data-driven decisions, minimizing uncertainties, and emphasizing innovation. The literature applies numerous analytics, for instance, business intelligence, big data analytics, and business analytics. Even though prior studies describe each of these terminologies somewhat differently, the terms include two frequent themes: the usage of data as a source for statistical analysis, the goal to enhance decision-making (Sleep, 2019).

The world is going digital. Undoubtedly, digitalization is one of the key trends shifting the economic system, society, and business. It discusses the usage of digital tools and data, and their relationship, which results in changes to present actions (Fernandez, 2021). Organizations are identifying an immense new flow of real-time data that can offer them a competitive edge (Pappas, 2018). The adoption of an analytical approach in decision-making for businesses has the possibility to optimize decisions through an analytical approach helps marketers to make data–driven decisions. However, to gain advantages of data-driven decision-making, analytics should be combined with applicable products, services, and business-level indicators (Shet, 2021). Data analytics has established itself significantly, driven essentially by improved data quality, improved technological opportunities, and growing analytical abilities in organizations (Sleep, 2019).

Several studies have highlighted the significance of real-time data analytics in enhancing organizational performance and encouraging a competitive edge. For instance, Smith (2021) and Johnson & Lee (2020) emphasized how real-time data allows organizations to recognize trends and make informed decisions, directly impacting innovation. There is no significant gap in the literature, as multiple studies have been done to explore the relationship between real-time data availability, analytics adoption, market responsiveness, and innovation level.

The previous literature mainly studies the relationship between real-time data analytics and innovation, and its impact on business productivity. It explores how real-time data analytics can enable different types of innovation as well as process and technology development. It seeks to understand how businesses can utilize real-time data analytics to improve their innovative competencies and eventually improve their productivity. Their findings highlighted that data analytics impact specifically on novel innovation. Moreover, real-time data analytics in modern retail investigates how retailers can utilize it to obtain a profound understanding of customer preferences and to optimize inventory and cut costs. It focuses more on the supply chain area of the business rather than the innovation side. The present studies have highlighted the importance of real-time data analytics to attain competitive advantage and process development. Research have highlighted that firm collects a variety of customer preferences and operational data, it faces challenges in fully utilizing real-time data analytics to drive product innovation and adapt quickly to changing market demands. Limited integration of real-time data availability and analytics adoption has hindered the firm's ability to respond effectively to customer trends, restricting its capacity to innovate. Investigating how real-time data analytics impacts market responsiveness and innovation could help firms in enhancing its product offerings and remain competitive.

The main objective of the study is to understand how real-time data analytics can help firms stay ahead of their competitors through innovation, and how it improves business agility. The aim is to see the impact of real-time data analytics on how it enables firms to take action on changing market environments, customer behaviour, and other important factors. The aim is to see opportunities for innovation using real-time data

analytics, as we are living in fast fast-moving era, it is important for firms to grab opportunities to stay ahead of their competitors and to go with the market trends as fast as businesses can. Another objective is how analytical adoption is beneficial for companies.

The significance of the research is to provide valuable insights to firms for innovation through the use of real-time data analytics. By using it, a firm can cater to emerging market trends and the development of their products and services. In a time period where consumer demands and market trends shift quickly, the firm need to adapt rapidly, and real-time data analytics allows businesses to enable data-driven, immediate responses to changes.

METHODOLOGY

The study leverages an empirical research design to explore the relationship between real-time data availability, market responsiveness, analytic adoption, and innovation level. The method is quantitative, with primary data collected through a questionnaire from FMCG businesses in the bakery sector. The research design confirms that the findings are based on real-world observations and measurable variables.

The primary data collected for the study is derived from a questionnaire. The collected data can be described numerically as quantitative data. The approximate population size is 500. For determining the sample size simple random sampling method is used. Simple random sampling is utilized for very similar populations, where respondents of the research are randomly selected to contribute to the research. Simple random Sampling is the easiest and utmost typical way of selecting a sample (Noor, 2022). The sample size used for the study is 200. For small to medium-sized populations (up to 500), Uma Sekaran suggests that the sample size should typically range from 30 to 50 or 30% of the population (Sekaran, 2016). The data was collected in approximately one month. The questionnaire consisted of five sections: Demographics, Real-time data availability, Analytics adoption, Market responsiveness, and Innovation level. Each section contained 5 items with a likert scale. Likert scale is a psychometric scale that has numerous categories from which respondents select to specify their thoughts, attitudes, or feelings about a specific subject (Nemoto, 2014).

The key variables included are real-time data availability, Analytics Adoption, and Market responsiveness (Independent variables) and Innovation level (dependent variable). Real-time data availability describes the availability of data as it is generated, allowing businesses to process and utilize information without any considerable delays. It confirms that businesses can get up-to-date information, allowing businesses to make informed decisions rapidly. Real-time analytics cannot function without real-time data. Database, data integration, and supplementary data management tools can now deal with new sources of real-time data that have originated online lately, entailing new sources of machine data, which stream from mobile devices and social media platforms (Russom, 2014).

Analytics adoption refers to the process by which businesses incorporate data analytics tools, technologies, and practices into their processes to enrich decision-making and strategic planning. It includes the efficient use of data collection, processing, and interpretation to initiate actionable insights that can influence efficiency, innovation, and competitiveness (Malladi, p. 2013). Businesses are adopting analytics tools, for instance, business intelligence, machine learning algorithms, and predictive modeling to recognize trends, solve problems, and expose opportunities. The process frequently demands cultural and structural modifications, for instance, training employees, and investing in infrastructure to support data-driven initiatives (Kumar A. &., 2020). Analytics adoption is not just about implementing technology; it is about leveraging an approach that prioritizes evidence-based decisions. This approach allows businesses to stay agile in an active environment by making informed decisions that align with business objectives. Eventually, it serves as a foundation for innovation and sustainable growth.

Market responsiveness is described as a competency that allows a business to respond swiftly to evolving market needs. Responsive firms are capable of adapting rapidly to evolving environmental conditions (Garrett R. P., 2009). Market responsiveness is defined in the literature as the firm's ability to react to changing market conditions (Zhou, 2019). It is a crucial capability as businesses are confronted by various

opportunities arising from changing customers' preferences and threats from competition (Khan, 2021). It enables a firm to adopt a specific strategy for competitiveness (Lee, 2010).

Innovation level represents the degree to which a business integrates new concepts, technologies, and processes into its operations to generate value, improve effectiveness, or respond to evolving market demands. It measures how efficiently businesses can advance and adapt to shifting environments by introducing unique and innovative products, services, or business models (Hughes, 2001). A high innovation level usually specifies that a business constantly explores innovative solutions, leverages radical technologies, and promotes a culture of continuous development. This level imitates the capability of a business to reflect ahead, challenge the status quo, and respond vigorously to competition and customer needs. Factors influencing innovation level include leadership, resource allocation, employee engagement, and the adoption of data-driven decision-making (Van Lancker, 2016). It assists as a key performance indicator in industries where adaptability and novelty are essential for long-term objectives. Innovation levels can be measured through metrics like the frequency of new product launches, market responsiveness, and analytics adoption.

Research Instrument

The data gathering instrument used for the study is a survey questionnaire that comprises closed-ended and structured items tailored to align with research objectives. Each item was developed to explore the role of real–time data analytics in driving business innovation. The questionnaire consisted of a total of five sections:

- Demographics: The initial section consisted of demographics containing 4 items related to gender, experience level, education, and age.

- Real–Time Data Availability: This section contained 5 items. This section provides information about organizations' accessibility and infrastructure capabilities for handling real-time data. Items include the organization's accessibility, decision-making, and capabilities of real-time systems.

- Analytics Adoption: Items in this section focus on the organization's culture regarding data-driven decisions, integration of data analytics in day-to-day operations, employees' skills in data analytics, and the existence of a specialized data analytics expert.

- Market Responsiveness: This section focuses on gathering information related to an organization's adaptability to market changes, finding market opportunities, making timely decisions, and agility and flexibility in a dynamic environment.

- Innovation Level: The last section of the questionnaire measures organization culture for innovation, the organization's reputation for innovative products/services, speed of innovation implementation, and innovation initiatives.

To examine the relationship between independent and dependent variables, this study employs linear regression analysis. It is a statistical method utilized to check the relationship between two or more variables. It discovers how a dependent variable is impacted by one or more independent variables. This analysis aims to find a linear relationship between the variables that can be used to grasp the influence of the independent variables on the dependent variable (DeVore, 2003). The type of linear regression analysis used in multiple linear regression. In multiple linear regression, there is more than one independent variable present in it (Tranmer, 2008).

$$IL = \beta + \beta\,RTDA + \beta\,AA + \beta\,MR\ldots\ldots\ldots\ldots\ldots\ldots.\ (A)$$

The dataset used numeric scales (1–5) to quantify the independent variables: real-time data availability, analytics adoption, and market responsiveness, as well as the dependent variable: innovation level. These scales were treated as interval data for regression analysis. A multiple linear regression model was run in SPSS to explore the relationships. Assumptions of Cronbach's alpha, normality, and multi-collinearity were checked and met. The analysis examined the standardized beta coefficients, p-values, and R-squared to assess the significance and strength of these relationships. This study brings a novel contribution to prior literature

by examining the intersection of real-time data analytics and business innovation. By integrating real-time data availability, analytics adoption, and market responsiveness as variables for innovation levels, the study offers an inclusive framework to comprehend how businesses can leverage analytics to stay competitive in dynamic environments.

RESULTS

The Cronbach Alpha value must be .70 or 70% is a satisfactory level of value. According to the above table, the real-time data availability reveals a 95.2% Cronbach alpha value. According to the above table, the Analytics Adoption reveals a 94.7% Cronbach alpha value with 5 items. According to the above table, the Market Responsiveness reveals a 94.4% Cronbach's alpha. According to the above table, the Innovation Level reveals a 94.7% Cronbach alpha value with 5 items. The result confirms the reliability. The results indicate that all variables confirm a strong, positive, and significant correlation with the real-time analytics at the level of 1%. Durbin-Watson value 1.963 shows no autocorrelation. The Durbin-Watson (DW) statistic is used to spot the existence of autocorrelation in the residuals from a regression analysis (Durbin, 1951).

Table 1: Cronbach's Alpha

Variables	Cronbach's Alpha	No. of Items
Real Time Data Availability	0.952 (95.2%)	5
Analytics Adoption	0.947(94.7%)	5
Market Responsiveness	0.944(94.4%)	5
Innovation Level	0.947(94.7%)	5
Overall	0.982(98.2%)	20

Table 2: Normality Testing

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
Innovation Level	0.185	295	.000	0.946	295	0.000
*p-value <0.005 shows data is not significantly normally distributed						

Table 3: Correlation Analysis

	Real Time Data Availability	Analytic Adoption	Market Responsiveness	Innovation Level
Real Time Data Availability	1			
Analytics Adoption	0.922**	1		
Market Responsiveness	0.854**	0.906**	1	
Innovation Level	0.845**	0.901**	0.915**	1
"* "and "** "Correlation is significant at the 0.05 and 0.01 level (2-tailed)				

If the statistics value remains significant at (p<= 5%), our model is stable. The high f-value reflects the strengths and reliability of the relationship between variables (Montgomery, 2012).

DISCUSSION

The findings revealed that real-time data availability, analytics adoption, and market responsiveness positively impact the innovation level in businesses. These results reveal that businesses utilizing real-time data analytics are better resources to drive innovation by using real-time data, adoption analytics, adapting promptly to market changes, and identifying emerging opportunities. Real-time data availability develops businesses' ability to make decisions and allows them to be innovative. Analytics adoption promotes innovation by enabling businesses to extract actionable insights for developing new products, services, and processes. Correspondingly, market responsiveness confirms that businesses can quickly align their strategies with evolving market trends, resulting in innovative outcomes.

These results conform closely with previous literature that highlights the crucial role of real–time data analytics in fostering innovation. For instance, organizations with access to real-time data foster agility, enabling cross-functional collaboration and iterative processes that enhance innovation levels (Davenport, 2017). Correspondingly, Zehir & M (2019) found that strong market responsiveness positively influences innovation capabilities, enhancing firm performance. Alghamdi (2023) found that incorporating data analytics significantly boosts a firm's strategic agility and innovation level.

Table 4: Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.931	0.867	0.866	0.32923	1.963
Durbin Watson value ranges from 0 to 3					

	Model	Sum of Squares	Df	Mean Square	F	Sig
1	Regression	205.476	3	68.492	631.907	0.000
	Residual	31.541	291	0.108		
	Total	237.018	294			

Table 5: Durbin-Watson statistics

	Model	Unstandardized Coefficients	Sig	Collinearity Statistics	
		B		Tolerance	VIF
1	(Constant)	0.141	0.078		
	Real-time data availability	0.026	0.630	0.147	6.791
	Analytical Adoption	0.388	0.0001	0.098	10.240
	Market Responsiveness	0.549	0.0001	0.177	5.646
Dependent Variable: Innovation Level					

The uniformity of these findings with prior literature assists in strengthening the validity of the theoretical framework, additionally confirming the hypothesis that real-time data analytics plays a vital role in driving business innovation. By confirming this relationship, the results emphasize the substantial impact of analytical-based decision-making on innovation, underlining that the incorporation of real-time data and analytics is not only impactful but also important in fostering innovation. Furthermore, prior research highlights the increasing significance of adopting real-time data-driven practices in business, as businesses endeavor to stay competitive and agile in an evolving, dynamic market.

The results contribute to the previous studies by facilitating empirical evidence on the interrelation of real-time data, analytics adoption, market responsiveness, and innovation. They validate the research that data analytics is a foundation for business innovation. The results highlight the significance of investing in real-time data infrastructure and analytical tools. By adopting analytics platforms and fostering a real-time data-driven culture, businesses can enhance their innovation capabilities. For instance, businesses can utilize real-time analytics to acquire knowledge about customer preferences and innovate their products accordingly. Policymakers can boost data-driven innovation by endorsing policies that facilitate data availability, confidentiality, and cross-functionality. Supporting businesses with resources to integrate real-time analytics can also encourage economic growth and competitiveness.

CONCLUSION

The study revealed a significant and positive impact of real-time analytics on innovation levels. This shows that businesses incorporating real-time analytics are better equipped to innovate efficiently, consistent with existing literature. The findings validate the projected hypotheses and offer strong empirical evidence for the role of real-time data analytics in driving innovation in businesses.

The findings significantly align with the proposed hypothesis and show a strong positive relationship. Real-time data availability has a positive impact on innovativeness and responsiveness, enabling quicker adaptation to market changes. Analytics adoption positively influences innovation level, fostering the development of new products or processes. Market responsiveness positively enhances the ability to detect opportunities for innovation by providing timely insights to react to market trends and consumer needs.

There are several limitations in this study. First, very limited independent variables are used for the analysis. Although these variables are fundamental, the exclusion of other possible variables might limit the inclusiveness of the analysis. Including other variables in future research could deliver a more holistic understanding of variables influencing innovation. Subsequently, the study is cross-sectional; it gathers data at a single point in time. This bounds the capability to form causal relationships between real-time data availability, analytics adoption, market responsiveness, and innovation level. The results of this study are grounded on an explicit sample size, which may limit the generalizability of the findings to other industries. A large-scale and more diverse sample could improve the validity of the results. The reliance on SPSS limits the exploration of advanced machine learning or methods that may provide deeper insights into the relationships.

This study contributes to the empirical evidence as research findings strongly align with the literature. It confirms the validation of results. The study identifies a positive relationship between independent and dependent variables, which reveals that adopting real-time data analytics positively contributes to the business innovation level. Future research can discover the prolonged effects of analytics adoption on innovation in different industries. Moreover, investigating cultural and other factors that mediate these relationships would offer deeper insights into how businesses can exploit innovation outcomes. Integrating data management systems that can access, capture, process, and analyze real-time data efficiently can benefit businesses in having a competitive edge and being innovative. Utilizing analytical tools can increase a business's competitiveness, ultimately leading to profitability. Analytics adoption can help businesses gain valuable, deeper insights, which can help in innovating products, services, and processes. Agility in operations can allow businesses to react to market changes promptly, ensuring that innovation processes are continuous.

DECLARATIONS

Consent to participate: Written consent had been obtained from participants. All methods were performed following the relevant guidelines and regulations.
Availability of Data and Materials: Data will be made available upon request. The corresponding author will submit all dataset files.
Competing interests: None
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AUTHORS' CONTRIBUTIONS

UA: Concept and design of study, critical intellectual input.
UA: Acquisition and analysis of data, drafting of the manuscript, and critical intellectual input.
UA: Acquisition of data, drafting of the manuscript.
The author had read and approved the final manuscript.

REFERENCES

Acciarini, C. C. (2023). How can organizations leverage big data to innovate their business models? A systematic literature review. Technovation, 123, 102713.

Aktaş, E. K. (2022). Real-Time Data Analysis (RTDA) and Proposed Innovative Business Models: A Conceptual Study of the Tourism Industry. International Journal of Organizational Leadership, 11.

Alghamdi, O. A. (2023). Boosting Innovation Performance through Big Data Analytics Powered by Artificial Intelligence Use: An Empirical Exploration of the Role of Strategic Agility and Market Turbulence. Sustainability, 15(19), 14296.

Babu, M. M. (2024). Exploring big data-driven innovation in the manufacturing sector: evidence from UK firms. Annals of Operations Research, 333(2), 689-716.

Batistič, S. &. (2019). History, evolution, and future of big data and analytics: a bibliometric analysis of its relationship to performance in organizations. British Journal of Management, 30(2), 229-251.

Bodlaj, M. (2010). The impact of a responsive and proactive market orientation on innovation and business performance. Economic and business review. 12(4), 2.

Braganza, A. B. (2017). Resource management in big data initiatives: Processes and dynamic capabilities. Journal of Business Research, 70, 328–337.

Brynjolfsson, E. A. (2016). The Rapid Adoption of Data-Driven Decision-Making.

Davenport, T. H. (2017). Competing on Analytics: The New Science of Winning. Harvard Business Review Press.

DeVore, C. (2003). Linear regression analysis. STAT.

Duan, Y. C. (2020). Understanding the impact of business analytics on innovation. European Journal of Operational Research, 281(3), 673-686.

Dubey, R. G. (2019). Big data and predictive analytics and manufacturing performance: Integrating institutional theory, resource-based view, and big data culture. British Journal of Management, 30(2), 341–361.

Durbin, J. &. (1951). Testing for serial correlation in least squares regression. Biometrika, 38(1/2), 159-178.

Fernandez, V. &.-G. (2021). Tackling the HR digitalization challenge: key factors and barriers to HR analytics adoption. Competitiveness Review. An International Business Journal, 31(1), 162-187.

Garrett, R. P. (2009). Market responsiveness, top management risk taking, and the role of strategic learning as determinants of market pioneering. Journal of Business Research, 62(8), 782-788.

Garrett, R. P. (2009). Market responsiveness, top management risk taking, and the role of strategic learning as determinants of market pioneering. Journal of Business Research, 62(8), 782-788.

Gupta, S. C. (2019). Circular economy and big data analytics: A stakeholder perspective. Technological Forecasting and Social Change. 144, 466-474.

Hox, J. J. (2005). Data collection, primary vs. secondary. Encyclopedia of social measurement, 1(1), 593-599.

Hughes, A. (2001). Innovation and business performance: small entrepreneurial firms in the UK and the EU. New Economy, 8(3), 157-163.

Khan, H. &. (2021). The efficacy of marketing skills and market responsiveness in marketing performance of emerging market exporting firms in advanced markets: The moderating role of competitive intensity. International Business Review, 30(6), 10.

Kumar, A. &. (2020). Business analytics adoption in firms: A qualitative study elaborating the TOE framework in India. International Journal of Global Business and Competitiveness, 15(2), 80-93.

Kumar, V. D. (2016). Research framework, strategies, and applications of intelligent agent technologies in marketing. Journal of the Academy of Marketing Science.

Lee, R. P. (2010). Extending the environment–strategy–performance framework: The roles of multinational corporation network strength, market responsiveness, and product innovation. Journal of International Marketing, 18(4), 58-73.

Malladi, S. (201). Adoption of business intelligence & analytics in organizations–an empirical study of antecedents.

Mazher, M. A. (2024). Leveraging Business Analytics for Enhanced Decision-Making: Navigating Challenges and Exploiting Opportunities. International Journal of Multidisciplinary: Applied Business and Education Research, 5(10), 4062-4071.

Montgomery, D. C. (2012). Introduction to Linear Regression Analysis (5th ed.). Wiley.

Müller, O. F. (2018). The effect of big data and analytics on firm performance: An econometric analysis considering industry characteristics. Journal of Management Information Systems, 35, 488– 509.

Nam, D. L. (2019). Business analytics adoption process: An innovation diffusion perspective. International Journal of Information Management, 49, 411-423.

Nemoto, T. &. ((2014, November).). Likert-scale questionnaires. In JALT 2013 conference proceedings (Vol. 108, No. 1, pp. 1-6).

Noor, S. T. (2022). Simple random sampling. International Journal of Education & Language Studies, 1(2), 78-82.

Pappas, I. O. (2018). Big data and business analytics ecosystems: paving the way towards digital transformation and sustainable societies. Information Systems and e-Business Management, 16, 479– 491.

Park Y, E. S. (2017). The role of business intelligence and communication technologies in organizational agility: a configurational approach. J Assoc Inform Syst, 18(9): 1.

Raji, M. A. (2024). Real-time data analytics in retail: A review of USA and global practices. GSC Advanced Research and Reviews, 18(3), 059-065.

Russom, P. S. (2014). Real-time data, BI, and analytics. Accelerating Business to Leverage Customer Relations, Competitiveness, and Insights. TDWI best practices report, fourth quarter, 5-25.

Sekaran, U. (2016). Research Methods for business: A building approach.

Shet, S. V. (2021). Examining the determinants of successful adoption of data analytics in human resource management–A framework for implications. . . Journal of Business Research, 131, 311-326.

Sleep, S. H. (2019). THE DATA HIERARCHY: Factors influencing the adoption and implementation of data-driven decision making. AMS Review, 9, 230–248.

Sun, S. C. (2018). Understanding the factors affecting the organizational adoption of big data. Journal of Computer Information Systems, 58(3), 193–203.

Sun, S. C. (2018). Understanding the factors affecting the organizational adoption of big data. Journal of Computer Information Systems, 58(3), 193–203.

Sun, S. C. (2018). Understanding the factors affecting the organizational adoption of big data. Journal of Computer Information Systems, 58(3), 193–203. Journal of Computer Information Systems, 58(3), 193–203.

Tranmer, M. &. (2008). Multiple linear regression. The Cathie Marsh Centre for Census and Survey Research (CCSR), 5(5), 1-5.

Van Lancker, J. M. (2016). The Organizational Innovation System: A systemic framework for radical innovation at the organizational level. Technovation, 52, 40-50.

Varma, M. A. (2020). Use of big data in the process of customer segmentation in the retail sector. Technoarete Transactions on Advances in Data Science and Analytics, 1(2).

Wu, L. H. (2020). Data analytics, innovation, and firm productivity. Management Science. 66(5), 2017-2039.

Yoshikuni, A. C. (2023). Big data and business analytics enabled innovation and dynamic capabilities in organizations: Developing and validating scale. International Journal of Information Management Data Insights, 3.

ZareRavasan, A. (2023). Boosting innovation performance through big data analytics: An empirical investigation on the role of firm agility. Journal of Information Science, 49(5), 1293-1308.

Zehir & M, C. (2019). The Relationship Between Market Orientation, Coopetition, Innovation Capabilities, And Firm Performance. Leadership, Technology, Innovation, and Business Management.

Zhou, J. M. (2019). The relationship between marketing agility and financial performance under different levels of market turbulence. Industrial Marketing Management, 31-41.