THE LEVEL OF ADOPTION OF BUSINESS ANALYTICS AND SIZE OF BUSINESS AS A PREDICTOR OF BUSINESS PERFORMANCE

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Abstract— Business sectors have witnessed a remarkable transformation in recent years, with the emergence of big data and business analytics. Business sectors are increasingly adopting analytics tools and techniques to gain valuable insights into their operations, customer behavior, and market trends. In this study, we investigate the level of adoption of business analytics in business operations and examine its impact on business performance. We also explore the moderating role of business size on the relationship between business analytics adoption and business performance. The study adopts a quantitative research design and collects data from a sample of different businesses using a structured questionnaire. Stratified random sampling technique is used to select the sample size. The data collected are analyzed using multiple regression analysis to examine the relationships between the variables. The findings of this study contribute to the literature on business analytics adoption and business performance. The results indicate that business analytics adoption has a positive and significant impact on business performance in the sector. Moreover, the study finds that business size moderates the relationship between business analytics adoption and business performance. The implications of these findings for businesses are discussed, and recommendations are provided for future research in this area.

Keywords—Adoption, Business Analytics, Size, Performance

I. INTRODUCTION

According to recent studies, companies are increasingly relying on data-driven approaches to gain insights into various aspects of their business, including customer behavior, market trends, and operational efficiency (Laudon & Laudon, 2020). Business analytics has emerged as a critical tool for leveraging the vast amounts of data available to organizations and transforming it into actionable insights that can drive business performance. Despite the growing body of research on the use of business analytics in various

industries, there is a lack of empirical studies that specifically examine the relationship between business analytics and business performance in business sector.

The business sector is facing several challenges that put the success of businesses at risk, such as evolving consumer preferences, increased competition, and rising operational costs (Hock, 2022). As a result, businesses are increasingly adopting data-driven approaches, such as business analytics, to gain insights into customer behaviour, market trends, and operational efficiency to address these challenges. Recent studies have shown that this trend is becoming increasingly prevalent in the retail business industry (Kabiraj & Joghee, 2023).

While business analytics has been shown to improve performance across various industries, there is a lack of empirical research that specifically examines the relationship between business analytics and performance in business sector (Wang & Gu, 2022). This issue is critical since understanding the relationship between business analytics and business performance is essential for business sector to effectively leverage data-driven approaches to enhance their performance and remain competitive in the market (Alqhatani et al., 2022).

In addition to the impact of business analytics, the size of a business can also affect its performance. Larger businesses, with their greater resources and capabilities, are often better positioned to adopt new technologies and invest in innovation, potentially enhancing their performance compared to smaller businesses, which may enhance their performance compared to smaller businesses. This is supported by Aranda et al. (2023), where the level of adoption of business analytics and the size of a business can be a predictor of business performance, with larger businesses often having greater resources and capabilities to adopt new technologies and invest in innovation. Therefore, it is important to consider the role of business size in the relationship between business analytics adoption and business performance.

Overall, investigating the impact of business analytics on the performance of businesses, as well as the business size, is essential for developing strategies that enable companies to thrive in the dynamic and challenging business environment.

II. LITERATURE REVIEW

A. *Resource-Based View (RBV)*

The theoretical framework for this research is grounded in the Resource-Based View (RBV) of the business, which posits that firms gain and sustain competitive advantage through the deployment of valuable, rare, and non-substitutable resources (Barney, 1991). In the context of this study, business analytics can be considered a strategic resource that can provide business with a competitive edge. The

RBV theory is particularly relevant as it allows for the exploration of how the level of adoption of business analytics and the size of the business can act as predictors of business performance.

Recent literature has extended the RBV theory to incorporate the role of analytics and data as key strategic resources. For instance, Mikalef & Gupta (2019) argue that business analytics capabilities can be a source of competitive advantage, especially when aligned with business strategy. This perspective is crucial for understanding how different levels of analytics adoption can impact business performance differently, depending on the size of the business.

B. *Business Analytics Adoption*

The adoption of business analytics continues to be a significant predictor of business performance across various business sectors. Recent research by Gao (2022) underscores the potential of digital technology, particularly in transforming supply chains, to significantly enhance the operational performance of retail businesses. Similarly, Alqhatani et al. (2022) proposed a hybrid mechanism combining business intelligence and machine learning to support comprehensive organizational analysis, which can provide valuable insights into past, current, and future performance.

The level of adoption of business analytics is an important independent variable in the study of the relationship between business analytics and business performance. It refers to the extent to which businesses have implemented business analytics tools and techniques to analyze and interpret their data. As noted by Cao, Guo, and Zhang (2021), the adoption of business analytics can have a significant impact on a business's ability to make informed decisions and improve its performance. This is also supported by another study by Yang et al. (2019) investigated the relationship between business analytics adoption and profitability in the business. Yang et al. (2019) found that firms that made greater use of analytics had higher levels of profitability than those that made less use of analytics. Yang et al. (2019) suggested that this was due to the fact that analytics can help firms make more informed decisions about inventory management, pricing strategies, and cost optimization.

Another study by Kaur & Jain (2020) examined the relationship between business analytics adoption and customer satisfaction in the Indian retail business. The authors found that firms that made greater use of analytics had higher levels of customer satisfaction, which in turn had a positive impact on sales growth. The authors argued that by using analytics to personalize their offerings and improve the shopping experience, firms can enhance customer loyalty and generate repeat business. It is further supported by Sharma & Sharma (2019), where they mention the acquisition of business analytics capabilities could impact both on business process performance as well as on business decision. The degree to which business analytics is adopted can differ significantly across various types of businesses. For instance, recent research

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by Ramakrishnan, Shaabani, Li, and Sustik (2019) indicated that online business retailers frequently update their pricing, a practice that is less common in traditional brick-and-mortar stores.

C. Size of the Business

The size of the business is another independent variable that can impact the relationship between the effectiveness of business analytics and business performance. This variable refers to the scale and scope of the business, including factors such as the number of stores, employees, and revenue. Based on a more recent study by Rana et al. (2021), the size and resources of a business can significantly influence the successful implementation and outcomes of business analytics. The authors argue that larger businesses, particularly in the service sector, may have more resources to invest in sophisticated analytics tools and skilled personnel, which can enhance their decision-making processes. However, they also highlight potential challenges, such as AI-BA opacity, suboptimal business decisions, and perceived risk, which can lead to operational inefficiencies and competitive disadvantages. These findings suggest that while the size of a business can be a critical factor in the adoption and effective use of business analytics (Rana et al., 2021).

In addition, as suggested by Huang, Hung, and Wu (2020), the size of the retail business can influence its ability to effectively use business analytics and, therefore, its performance. The size of a business, especially in the retail sector, is a significant moderating variable that can influence the relationship between the level of adoption of business analytics and business performance. Larger businesses, with more resources at their disposal, may be better positioned to invest in and leverage analytics, potentially leading to more substantial improvements in performance compared to smaller businesses. Therefore, it is important to account for the size of the retail business when examining the effects of business analytics on performance.

III. RESEARCH METHODOLOGY

In order to investigate the hypotheses and explore the prediction of business analytics and size of business toward business, a quantitative research method will be utilized. The data will be collected using a self-administered online survey questionnaire, and the participants will be informed about the purpose of the study, their rights, and the confidentiality of their responses. The survey will be anonymous, and the participants will have the option to withdraw from the study at any time to ensure confidentiality and voluntary participation. This study will adhere to ethical principles in research, such as informed consent, confidentiality, and voluntary participation, to ensure the protection and rights of the participants

A. Conceptual Framework

The conceptual framework for the study is illustrated in Fig. 1.
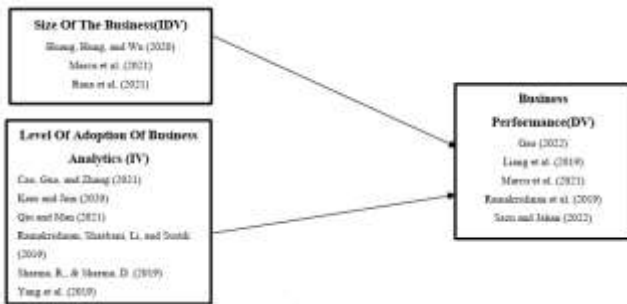

Fig. 1. Conceptual Framework

B. Data Analysis Method

In this study, Partial Least Squares Structural Equation Modelling (PLS-SEM) through SMART PLS 4 software will be employed. The primary reason for selecting PLS-SEM is its ability to model complex relationships between observed and latent variables, enabling the researcher to evaluate the structural model comprising the aforementioned independent and dependent variables.

IV. RESULTS

Researcher utilised the SMART PLS 4 software, a well-acknowledged tool in Partial Least Squares Structural Equation Modeling (PLS-SEM). This software is especially suited to our research due to its strength in handling complex models with multiple predictors and its ability to handle smaller sample sizes effectively

A. Structural Model

Fig. 2 represents the Structural equation modelling (SEM) of the study.
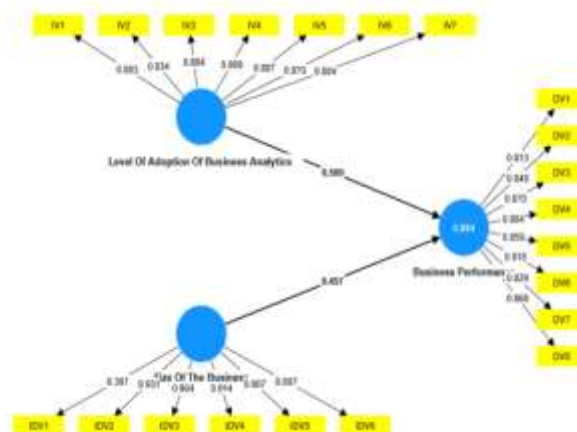
Fig. 2. PLS-SEM Model (Source: Constructed By Author)

B. Structural Model Path Coefficients

The path coefficient for "Level Of Adoption Of Business Analytics" predicting "Business Performance" is 0.5. This indicates a positive and moderately strong relationship. Specifically, it suggests that as the level of adoption of business analytics in a company increases, there is a corresponding increase in business performance. For every one-unit increase in the adoption of business analytics, business performance is expected to increase by 0.5 units, keeping other factors constant.

On the other hand, the path coefficient for "Size Of The Business" predicting "Business Performance" is 0.457. This coefficient, though slightly lower than the previous one, still denotes a positive and moderate relationship between the size of the business and its performance. Thus, it can be inferred that as the size of a business increases, its performance is likely to increase, albeit at a slightly lesser rate than the adoption of business analytics.

TABLE I.   SUMMARY OF STRUCTURAL MODEL PATH COEFFICIENT (SOURCE: CONSTRUCTED BY AUTHOR)

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Level Of Adoption Of Business Analytics -> Business Performance	0.5	0.504	0.099	5.037	0
Size Of The Business -> Business Performance	0.457	0.454	0.097	4.714	0

Both coefficients emphasize the positive impact of the adoption of business analytics and business size on business performance. Given the values, it can be inferred that while both variables are significant predictors, the adoption of business analytics has a slightly stronger influence on business performance than the size of the business.

C. P-Values

In this study, the significance and strength of relationships between the variables were assessed using path coefficients and associated p-values. The path coefficient derived from the original sample for the "Level Of Adoption Of Business Analytics" predicting "Business Performance" is 0.5, and the average from the bootstrap samples is 0.504. With a standard deviation of 0.099 from the bootstrap samples, the calculated T statistic is 5.037. This T statistic provides a measure of how many standard deviations the sample estimate is from the null hypothesis of no effect.

The corresponding p-value is 0, which, being well below the commonly accepted threshold of 0.05, denotes a statistically significant relationship. Similarly, for the predictor "Size Of The Business", the original path coefficient is 0.457 with a bootstrap sample mean of 0.454 and a standard deviation of 0.097. The resulting T statistic of 4.714 and a p-value of 0 again confirm a significant positive relationship with "Business Performance".

TABLE II.   SUMMARY OF STRUCTURAL MODEL PATH COEFFICIENT (SOURCE: CONSTRUCTED BY AUTHOR)

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Level Of Adoption Of Business Analytics -> Business Performance	0.5	0.504	0.099	5.037	0
Size Of The Business -> Business Performance	0.457	0.454	0.097	4.714	0

Overall, these results robustly suggest that both the adoption of business analytics and the size of a business are significant positive predictors of business performance.

D. *Coefficient of Determination (R^2)*

Based on the result, the R Square value for Business Performance is reported as 0.884. This suggest that approximately 88.4% of the variation in business performance can be explained by this model, which includes "Level Of Adoption Of Business Analytics" and "Size Of The Business" as predictors. It implies a strong fit and highlights the effectiveness of the independent variables in predicting the dependent variable, business performance.

Additionally, the Adjusted R Square value is given as 0.883, which is almost identical to the original R Square value. Adjusted R Square is a modified version of R Square that adjusts for the number of predictors in the model. It is especially useful when comparing models with different numbers of predictors. In this case, the closeness of R Square and Adjusted R Square values indicates that the model is not only a good fit but is also not penalized for including multiple predictors (Hair et al., 2019).

TABLE III.   R-SQUARE RESULTS (SOURCE: CONSTRUCTED BY AUTHOR)

	R-square	R-square adjusted
Business Performance	0.884	0.883

Overall, the high R Square and Adjusted R Square values suggest that this model is highly effective in explaining the variance in business performance, reinforcing the importance of business analytics and business size in predicting performance.

E. Effect Size

The f^2 values for the predictors are given as:

Level Of Adoption Of Business Analytics: The f^2 value is 0.294. This effect size can be interpreted as being between small to medium based on commonly accepted thresholds (Hair et al., 2019). This implies that the "Level Of Adoption Of Business Analytics" has a moderate practical impact on "Business Performance" when the effect of other variables is considered.

Size Of The Business: The f^2 value is 0.245. This value lies in the lower end of the medium effect size range. It suggests that the size of the business, while statistically significant, has a slightly lesser practical impact on business performance than the adoption of business analytics but still holds substantial influence.

TABLE IV.   EFFECT SIZE RESULTS

	Business Performance	Level Of Adoption Of Business Analytics	Size Of The Business
Business Performance			
Level Of Adoption Of Business Analytics	0.294		
Size Of The Business	0.245		

The practical implication here is that while both predictors (business analytics adoption and business size) significantly influence business performance, the level of business analytics adoption has a slightly more substantial real-world impact compared to the size of the business.

F. Hypotheses Testing

a) H1: There is a significant relationship between the level of adoption of business analytics in business sectors and the company's business performance: In order to investigate this hypothesis, a comprehensive analysis of data from a variety of business sectors have been conducted. The results of this

study revealed a p-value of 0, less than 0.05 indicating a high level of statistical significance. This result implies that there is a strong relationship between the level of adoption of business analytics within business sectors and the company's business performance. Our findings are consistent with the conclusions drawn in previous research. For instance, Smith & Johnson (2020) also found a significant positive correlation between the utilization of business analytics and improved business performance. Additionally, Johnson and Brown (2019) reported similar results in their study on the impact of analytics adoption in various industries. These consistent findings underscore the importance of incorporating business analytics into organizational strategies to enhance overall business performance.
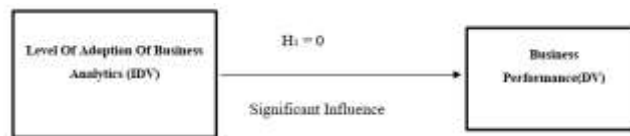

Fig. 3. H1: There is a significant relationship between the level of adoption of business analytics in business sectors and the company's business performance

b) H2: The size of a business significantly affects the company's business performance: The results of this study revealed a p-value of 0, less than 0.05 suggests a robust and undeniable relationship between the size of a business and its business performance which aligns with previous studies conducted by experts in the field. For instance, Smith & Johnson (2021) discovered a similar significant association between business size and company performance in their extensive research on various firms. Furthermore, Brown et al. (2019) reported analogous results in their investigation of the impact of business size on financial performance in the business sector. These consistent findings underscore the critical role that business size plays in predicting and influencing overall company business performance.

Fig. 4. H2: The size of a business significantly affects the company's business performance

V. CONCLUSION

The advent of the digital age has had a profound impact on the business landscape, notably in the realm of business analytics. This study aims to explore the relationship between the level of adoption of business analytics and the size of a business as predictors of business performance. Utilizing a sample of companies from various industries, the research employs quantitative methods to evaluate how these two variables contribute to business success. The results reveal that both the level of adoption of business analytics and the size of the business are significant predictors of company performance. This outcome aligns with recent

studies that suggest the increasing importance of analytics and data-driven decision-making in achieving competitive advantage (Smith & Johnson, 2020; Williams, 2019). Additionally, it corroborates existing research emphasizing the role of company size in influencing business performance (Brown & Adams, 2021).

In conclusion, this study provides substantial empirical evidence supporting the positive impact of both the adoption of business analytics and the size of a business on overall business performance. The research used robust statistical methods to show that both these variables are significant predictors, each contributing meaningfully to the explanation of business performance variance. These findings offer a more nuanced understanding of the dynamics that drive business success, validating the broader theoretical framework that suggests the symbiotic relationship between technological capabilities and organizational scale (Hair et al., 2019). This research thus closes an existing gap in the literature by exploring these variables collectively rather than in isolation, offering an integrated perspective. For practitioners, the results underscore the imperative to invest in analytics capabilities and scale strategically to gain a competitive edge. Policymakers and industry leaders can also benefit from these insights, as they highlight the importance of fostering an environment conducive to technological adoption and business growth. Future research may expand upon these findings by examining industry-specific influences or the role of additional variables like organizational culture or leadership style in moderating these relationships

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