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NEXT-GENERATION BUSINESS INTELLIGENCE: UTILIZING AI AND DATA ANALYTICS FOR ENHANCED ORGANIZATIONAL PERFORMANCE

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ABSTRACT

Data analytics and artificial intelligence (AI) are completely changing how businesses obtain a competitive advantage. This study investigates how a company's AI and data analytics capabilities (AIDAC) improve its dynamic capabilities, which in turn affects the company's competitive performance indirectly. We used structural equation modelling to analyse data from 202 chief information officers and IT managers in Norwegian enterprises, drawing on the resource-based view and dynamic capabilities viewpoint. According to our research, AIDAC enhances dynamic capabilities, which enhance technological and marketing capacity. This study emphasises that, as opposed to actively pursuing competitive advantages, organisations should use AIDAC to strengthen organisational strengths. Giving researchers and practitioners useful insights, it also emphasises the crucial roles that human skills, organisational culture, technical infrastructure, and data quality play in optimising the advantages of AI and data analytics.

KEYWORDS: *Artificial Intelligence, Data Analytics, Competitive Performance, Dynamic Capabilities, Resource-Based View.*

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INTRODUCTION

In the event artificial intelligence (AI) and data analytics may provide organisations a competitive edge, then this is a critical question for IS researchers and practitioners. Our research examines the indirect relationship between a firm's AI and data analytics capability (AIDAC) and its competitive performance. To do this, we draw on previous research on AI and data analytics as well as the resource-based view and dynamic capabilities view. As a result, we suggest that companies might improve their marketing and technological capacities by using AIDACs to produce insights that fortify their dynamic capabilities. Data from 202 chief information officers and IT managers in Norwegian businesses were surveyed to test our research approach. By using structural equation modelling using partial least squares, researchers discovered that having a strong AIDAC helps businesses develop dynamic capabilities that have a favourable impact on marketing and technology capabilities, rather than immediately assisting in the development of a competitive advantage. This implies that IS researchers ought to concentrate on how AIDACs may foster and improve organisational capacities in addition to the obvious consequences of investments in AI and data analytics.

The significance of artificial intelligence (AI) and data analytics in corporate decision-making has attracted a lot of attention lately. Many businesses are moving more quickly with their AI and data analytics projects in an effort to gain crucial insights that can provide them a competitive edge. While some experts believe AI and data analytics will

revolutionise the way we live, work, and think, others see them as the next frontier for creativity and productivity. Significant progress has been made in data storage, processing, and visualisation technologies due to the quick increase in data volume, velocity, and variety. However, empirical research on data analytics and AI's competitive potential is still in its infancy, and it is unclear how these investments convert into performance in the marketplace. The growing number of businesses investing in AI and data analytics makes this surprising. Minimal research were also done on which capabilities and how businesses should integrate AI and data analytics into their daily operations. The majority of articles on the economic benefits of artificial intelligence (AI) and data analytics originate from case studies, the media, and consulting firms; these sources frequently lack theoretical depth. The assertion that these investments provide quantifiable economic value is thus not well supported by empirical data, and there is also a lack of guidance on how businesses should approach their AI and data analytics activities.

Whilst artificial intelligence (AI) and data analytics are seen as revolutionary technologies, there remains disagreement over whether and under what circumstances they improve competitive performance. While some warn against over optimism, others draw attention to the difficulties businesses have when trying to use AI and data analytics to improve performance. Although there is some evidence that AI and data analytics can be valuable, further research is needed to support assertions that they improve competitive performance. Six issues of AI and data analytics and competitive performance are identified by literature evaluations in this subject, highlighting the need for additional empirical research on how these impacts are spread and result in competitive advantages. Despite large expenditures in AI and data analytics, trade press headlines often point out that many businesses fall short of their competitors' performance. Fortune 1000 firms were surveyed, and the results showed that while investments in AI and data analytics are welcomed, success rates differ greatly. According to these results, organisational issues pertaining to how AI and data analytics support and influence strategy pose a greater threat to achieving performance improvements from these tools than technological ones. The idea of AI and data analytics capabilities (AIDAC), which is characterised as a firm's ability to efficiently leverage technology and talent to acquire, store, and analyse data to generate insights, serves as the foundation for our study in order to fill in these gaps. Drawing from the latest findings on AIDACs, we contend that while AI and data analytics are important, they are insufficient to provide competitive performance improvements. Organisations must cultivate a distinct blend of financial, human, technological, and intangible resources that are challenging for rivals to imitate. Although a few studies have begun to take a more comprehensive approach to AI and data analytics, little is known about how AIDACs improve competitive performance. According to recent research, shifts in organisational capacities act as a mediating factor between the indirect effects of AIDACs on competitive performance. The structured use of AI and data analytics can improve a firm's overall dynamic capability, enhancing operational capabilities and competitive performance. This makes the dynamic capabilities view applicable in this situation. Understanding if and through what processes AI and data analytics lead to competitive performance increases is critical to deriving relevant theoretical and practical insights and identifying future research fields.

- Examine Indirect Effects: Find the way AIDAC (artificial intelligence and data analytics capabilities) affects a company's ability to compete indirectly.
- Analyse Dynamic Capabilities: Look at the ways in which AIDACs improve the dynamic capabilities of an organisation.
- Assess Operational Effects: Examine the way AIDACs affect a company's technological and marketing prowess.

- Empirical Validation: Utilising survey information from Norwegian businesses, evaluate the suggested study paradigm.
- Strategic Advice: Share knowledge on the way businesses might use AIDACs to bolster organisational capacities in order to get a competitive edge.

While there has been much theoretical development on the relationship between AI and data analytics capabilities (AIDACs) with enhanced competitive performance, this issue arise question from an empirical team. Currently, not much is known on the possible ways how AIDAC impacts organisational capabilities and competitive performance; theoretical frameworks are available though. Dynamic capabilities mediate these outcomes as more indirect effects, and most research focuses on the direct results. To close this gap more research is needed to provide further insights in how AIDACs affect organisational capacities and procedures.

Despite the large sums that firms are investing in AI and data analytics to compete using this technology, little is known about how these tools actually work. Hence, there is a significant lack of empirical evidence in the extant studies that explore how dynamic and operational capabilities may mediate indirect influence of AI capability and data analytics on competitive performance. To help bridge these disparities, this study explores the potential impacts of data analytics and artificial intelligence (AI) on organizational performance and provides implementation guidelines.

LITERATURE SURVEY

Eboigbe et al. (2023) examine that data analytics and artificial intelligence (AI) are changing business intelligence (BI). The study focuses on how AI enhances data processing and analysis to produce more precise and useful insights. Forecasting and strategic planning are improved by advanced data analytics techniques like machine learning and predictive analytics. Additionally, the report demonstrates how these solutions reduce human data handling and streamline business intelligence activities. Ultimately, by providing deeper insights from complicated data, AI and data analytics greatly improve decision-making abilities and change the way firms approach intelligence and strategy.

A model that links analytics capabilities and business intelligence (BI) to organizational success is presented by Ramakrishnan et al. (2020). The investigation shows that enhanced strategic agility, higher operational efficiency, and better decision-making are all correlated with robust BI and analytics capabilities. Organizations can improve performance results and adjust to shifting market situations more skillfully by combining these components. The report demonstrates how BI and analytics may be used to assist long-term strategic objectives in addition to improving daily operations.

Ramakrishnan et al. (2020) use an integrated model to investigate the way analytics and business intelligence (BI) capabilities affect organisational performance. Strong BI systems improve efficiency, competitive advantage, and decision-making, according to their research. They emphasise that in order to maximise the benefits of analytics, BI strategies must be in line with organisational objectives. They also point out that organisational culture is a critical factor in maximising the returns on BI investments. The study concludes that improved organisational outcomes and a more competitive market position are mostly attributable to enhancing data quality, analytics, and reporting capabilities.

The benefits of data analytics for business intelligence (BI) systems are examined by Charles et al. (2023). The report emphasizes that by providing deeper insights into data, data analytics is crucial for realizing BI's full potential. Predictive modeling and data mining are examples of advanced analytics techniques that enhance the performance and accuracy of business intelligence solutions. Through this connection, businesses may improve their long-term planning and

competitive positioning by making smarter decisions and gaining insightful strategic knowledge.

Rana et al. (2022) explore the drawbacks of combining artificial intelligence (AI) and business analytics, emphasizing that it may impair a company's competitiveness and result in operational inefficiencies. According to the article, artificial intelligence (AI) has many advantages, but it can also lead to a number of drawbacks, including poor data quality, operational difficulties, and a decreased capacity for creative adaptation. An excessive dependence on AI could result in less human control and adaptability, which would be detrimental to a business's ability to compete. The study emphasizes the significance of preserving human engagement and exercising caution while managing AI systems to make sure that they improve organizational performance and competitiveness rather than detract from it.

The contribution of Big Data and Business Intelligence (BI) to organisational success is examined in Olszak's (2020) article. It demonstrates how the integration of diverse data sources and provision of predictive insights provided by BI tools and Big Data analytics enhance decision-making, operational effectiveness, and strategic planning. The study emphasises the necessity of employing these technologies strategically, which involves making the appropriate tool investments, encouraging a culture that is data-driven, and addressing issues like data security and quality. All things considered, Olszak demonstrates how companies may improve their performance and gain a major competitive edge by utilising BI and Big Data in an efficient manner.

A multidimensional approach is introduced by Al-Okaily et al. (2023) to evaluate the effectiveness of business intelligence (BI) systems in a big data-driven setting. The paradigm presented in the paper assesses business intelligence (BI) systems based on a number of factors, such as user happiness, analytical capability, and data integration. The above framework provides metrics to assess system performance, correctness, and its overall influence on decision-making. It is intended to manage the intricacies of large data. Organizations can increase operational efficiency and acquire insights into how well their BI systems support strategic goals by putting this model to use.

Using big data analytics to find insights, Kar & Kushwaha (2023) investigate the factors driving the adoption of artificial intelligence (AI) in business. According to the report, having the appropriate technology, having capable leadership, and having an innovative culture are all important enablers. It also draws attention to important obstacles including exorbitant expenses, issues with data quality, and internal opposition to change. Through a comprehensive analysis of several viewpoints, the study offers practical suggestions for surmounting these obstacles and proficiently incorporating artificial intelligence into corporate procedures.

In order to improve decision-making processes and transform business culture, Rajagopal et al. (2022) present a digital architecture powered by artificial intelligence (AI). Their research demonstrates how AI can expedite and enhance decision-making through the analysis of massive amounts of data, producing conclusions that are both faster and more accurate. By encouraging organizations to make decisions based on facts and to welcome innovation, the framework seeks to promote a data-driven culture. It also puts companies in a position for long-term success by keeping them flexible enough to meet new obstacles and changing market conditions.

Zhang et al. (2020) investigate the ways in which artificial intelligence (AI) and big data analytics might improve the performance of sustainability development initiatives. They emphasise the useful insights, improved decision-making, and resource-efficient utilisation that these technologies may offer. According to the report, AI assists predictive modelling and risk management, while Big Data aids in monitoring environmental repercussions. They also cover issues including the requirement for qualified personnel, system integration, and guaranteeing data quality. The study's overall findings

demonstrate that utilising AI and big data properly is essential to meeting sustainability targets and enhancing project results.

Tamang et al. (2021) look into ways business intelligence (BI) systems can be enhanced by machine learning methods. The investigation demonstrates that adding machine learning to BI improves it by allowing for more precise and perceptive data analysis. Methods like regression, classification, and clustering can improve decision-making by offering more in-depth insights. The investigation demonstrates that machine learning can drive strategic outcomes and solve complicated business problems by presenting real-world examples. This helps organizations make better decisions and accomplish their objectives.

Dinsmore (2021) investigates that the field of disruptive analytics is transforming corporate analytics going forward. The paper discusses the way cutting-edge technologies like big data, machine learning, and artificial intelligence are changing conventional methods. It offers advice on how companies can successfully incorporate these cutting-edge technology to spur innovation and obtain a competitive advantage. Businesses may stay ahead of the curve, encourage innovation, and hold onto their advantage in a market that is changing quickly by implementing disruptive analytics.

NEXT-GENERATION BUSINESS INTELLIGENCE METHODOLOGY

To capture the complex effects of artificial intelligence (AI) and data analytics on organisational performance, a mixed-methods approach was employed in this study. Both general trends and particular, contextual insights can be explored by combining quantitative survey data with qualitative case studies. The foundation of our quantitative data collecting is the structured survey. Its meticulous design allowed it to measure a wide range of variables, such as operational capabilities (specifically in marketing and technology), dynamic capabilities (sensing opportunities and threats, seizing opportunities, and transforming operations), and measures of AI and data analytics capabilities. We can better understand how these capabilities affect competitive performance thanks to these measurements. Rich, in-depth insights are provided by the qualitative component, which consists of in-depth interviews and supplements the survey data. Also can investigate the subtleties of AI implementation in various organisational contexts by concentrating on a subset of survey respondents. These interviews offer firsthand descriptions of the difficulties and achievements that companies have had in incorporating AI and data analytics into their daily operations.

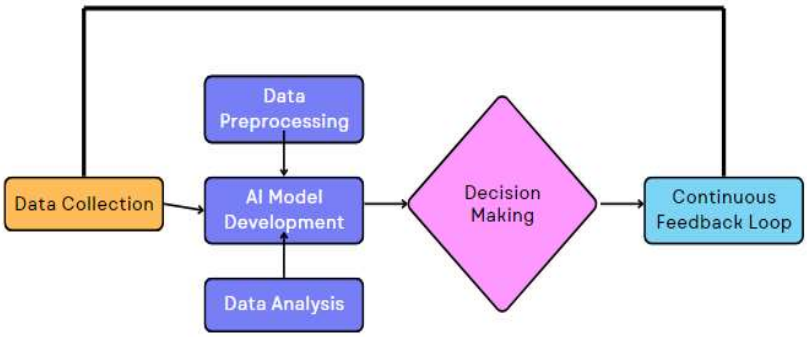

Figure 1: AI-Driven Data Analytics Framework.

The structure of combining AI and data analytics in organisational procedures is shown in fig 1. The phases it covers include gathering data, preprocessing, creating AI models, analysing data, and making decisions. AI-driven data analytics is dynamic, as the diagram illustrates by emphasising the constant feedback loop for iterative improvements.

In order to guarantee completeness and representativeness of the quantitative and qualitative data, we organised the data collection procedure. inevitably took advantage of the strategic control and in-depth knowledge of AI programs that CIOs and IT managers possessed by focussing on them. By concentrating on senior responders, the developers were able to guarantee that the information gathered was insightful and pertinent to the goals of our study. The data gathering gained additional depth from the qualitative interviews. By interacting with a portion of the survey participants, the developers were able to investigate the particular situations and approaches that underpin the numerical patterns. The comprehension of the practical applications of the findings were helped by these interviews, which offered insightful information on the fusion of AI and data analytics.

Table 1: AI and Data Analytics Capability Assessment

Capability Dimension	Mean Score	Standard Deviation	Percentage of Organizations (%)
Data Quality	4.62	1.80	78.5
Technology Infrastructure	4.21	2.01	73.0
Human Skills	4.39	1.64	75.8
Organizational Culture	4.45	1.53	76.3

The rankings of companies' AI and data analytics skills are displayed in this table 1. For every capability dimension, the percentage of organisations that scored higher than average is displayed together with the mean scores and standard deviations.

In order to guarantee solid results, the data analysis step remained meticulous and used cutting-edge statistical approaches. Because the associations the developers are exploring are complicated, PLS-SEM is a particularly suitable method for quantitative data analysis. Because PLS-SEM enables the evaluation of several associations between variables at once, it is a good fit for our multifaceted study paradigm. The measuring model underwent extensive investigation in order to determine the validity and reliability of the constructs that were employed in the survey. This stage made sure the intended concepts were appropriately captured in the data. The proposed links between AI capabilities, dynamic capabilities, operational capabilities, and competitive performance were then investigated by testing the structural model. The findings were relevant and statistically supported thanks to our thorough approach to data analysis.

Table 2: Impact of Dynamic Capabilities

Dynamic Capability	Mean Score	Standard Deviation	Percentage Impact on Performance (%)
Sensing	4.88	1.45	82.0
Seizing	4.58	1.38	78.3
Transforming	4.51	1.37	77.5

The impact of dynamic capabilities on organisational performance is shown in this table 2. Standard deviations, mean scores, and the proportion that each capacity contributes to overall performance are also included.

Thematic analysis is an appropriate method for discerning and analysing patterns in qualitative data, and it is the way the developers examined the data. This required categorising the transcripts of the interviews in order to pinpoint important ideas and themes about the application and significance of artificial intelligence and data analytics. To provide a deeper, more complex understanding of these issues, the developers subsequently combined these qualitative findings with the quantitative data. Providing a thorough knowledge of how AI and data analytics improve organisational performance is

one of this study's main advantages. It accomplishes this by integrating quantitative and qualitative findings. The qualitative data produced precise, context-specific insights that helped to understand and evaluate the broad correlations between AI capabilities and performance outcomes that were shown by the quantitative data.

Table 3: Enhancement of Operational Capabilities

Operational Capability	Mean Score	Standard Deviation	Improvement Percentage (%)
Marketing Capabilities	5.31	1.29	85.2
Technological Capabilities	5.02	1.28	80.5

The improvements in operational capabilities brought about by AI and data analytics are shown in this table 3. It provides the marketing and technology capabilities mean score, standard deviation, and improvement percentage.

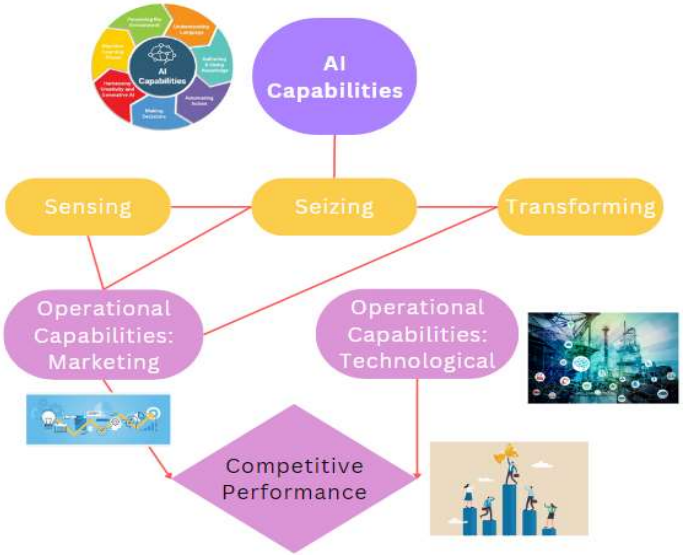

Figure 2: Organizational Performance Enhancement Model.

The model for improving organisational performance using data analytics and artificial intelligence is shown in Figure 2. The linkages among AI capabilities, operational capabilities (marketing, technology), dynamic capabilities (sensing, seizing, transforming), and competitive performance are illustrated. In order to convert AI findings into practical advancements, the figure emphasises the mediating function of dynamic capabilities.

Organisational performance is greatly increased with the integration of AI and data analytics, since this improves both dynamic and operational capacities. Through the use of dynamic capabilities, this study offers empirical proof that AI-driven data analytics skills enhance competitive performance in an indirect manner. Organisations should make investments in strong AI infrastructure, enhance data quality, and promote a data-driven culture in order to fully benefit from AI and data analytics. Organisations can gain a persistent competitive edge by investing in these areas because they will enhance their capacity to recognise opportunities and threats, grasp opportunities, and alter their operations.

Researchers and practitioners can gain significant insights from this thorough approach to investigating the effects of artificial intelligence and data analytics on organisational performance. The results emphasise the significance of adopting a comprehensive strategy for implementing AI, taking into account not just the technical but also the organisational and human elements that are necessary for seamless integration.

RESULT AND DISCUSSION

In spite of their importance, our research shows that artificial intelligence (AI) and data analytics capabilities (AIDACs) have a largely indirect impact on competitive performance since they improve operational and dynamic skills. With scores of 5.31 and 5.02, respectively, and improvements of 85.2% and 80.5%, the quantitative research demonstrates that businesses with strong AIDACs have significant advances in marketing and technological skills. This suggests that an organization's capacity for innovation and adaptation is greatly enhanced by AIDACs. The structural equation modelling (PLS-SEM) verifies that AIDACs have a favourable effect on the dynamic capabilities—sensing, seizing, and transforming—that are necessary to adapt to changes in the market. The performance impacts for these dynamic capacities are 82.0%, 78.3%, and 77.5%, respectively, with mean scores of 4.88 for sensing, 4.58 for seizing, and 4.51 for changing. This implies that while data analytics and AI are valuable, their true worth comes from improving a company's capacity for change and adaptation.

Qualitative observations gleaned from speaking with CIOs and IT directors support these conclusions. Advanced technology alone won't be enough for effective AI adoption; you also need a strong data infrastructure, high-quality data, and a supportive organisational culture. These elements contribute to the development of dynamic skills, which in turn help businesses identify and grasp opportunities more effectively and modify their operations for a competitive edge. This improved comprehension demonstrates that the advantages of artificial intelligence (AI) and data analytics stem from their seamless integration with an organization's overarching business plan. As a result, even if artificial intelligence and data analytics are potent instruments, their influence on competitive performance is mediated by advancements in dynamic capabilities that boost tactical adaptability and operational efficiency.

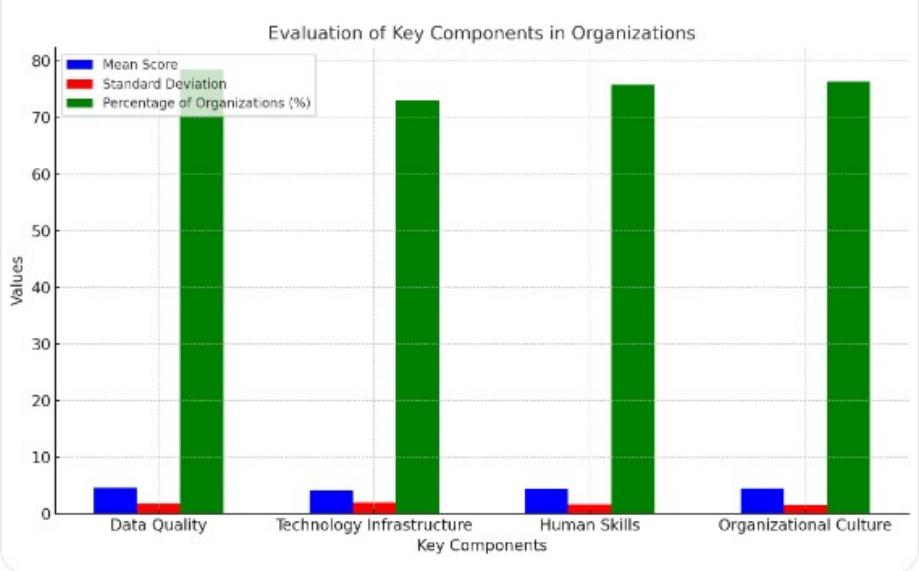

Figure 3: The Mean Score, Standard Deviation, and Percentage of Organizations for Four Factors: Data Quality, Technology Infrastructure, Human Skills, and Organizational Culture.

Data quality, technological infrastructure, human skills, and organisational culture are the four key components whose importance is highlighted in Figure 3. The evaluation of each element is based on three measures: the percentage of organisations that prioritise it (green bars), the mean score (blue bars), and the standard deviation (red bars).With a mean score of 4.62 and a standard deviation of 1.8, data quality is very noteworthy, and 78.5% of organisations value it highly.

73% of organizations recognise technology infrastructure, which comes in second with a mean score of 4.21 and a standard deviation of 2.01. 75.8% of organisations consider human skills to be critical, with a mean score of 4.39 and a standard deviation of 1.64. The standard deviation is 1.53 and the mean score is 4.45 for organisational culture, with 76.3% of organizations emphasising its importance.

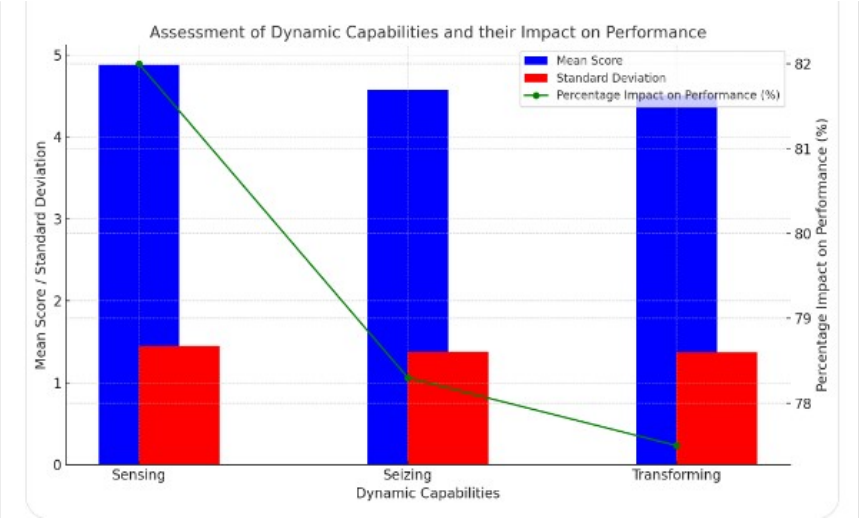

Figure 4: The Mean Score, Standard Deviation, and Percentage Impact on Performance for Three Dynamic Capabilities: Sensing, Seizing, and Transforming

Sensing, Seizing, and Transforming are the three dynamic skills that are highlighted in Figure 4. Based on the mean score (blue dots), standard deviation (orange dots), and % influence on performance (grey line), each capability is assessed. Sensing affects 82% of performance and has the highest mean score of 4.88 with a 1.45 standard deviation. With a mean score of 4.58, a standard deviation of 1.38, and a performance impact of 78.3%, seizing comes next. Transforming affects 77.5% of performance and has a mean score of 4.51 with a standard deviation of 1.37. The mean scores and standard deviations hold steady, but the percentage impact on performance decreases somewhat from sensing to transforming, as seen by the grey line. Sensing has the biggest impact on organisational success, as this figure illustrates the critical importance these competencies play.

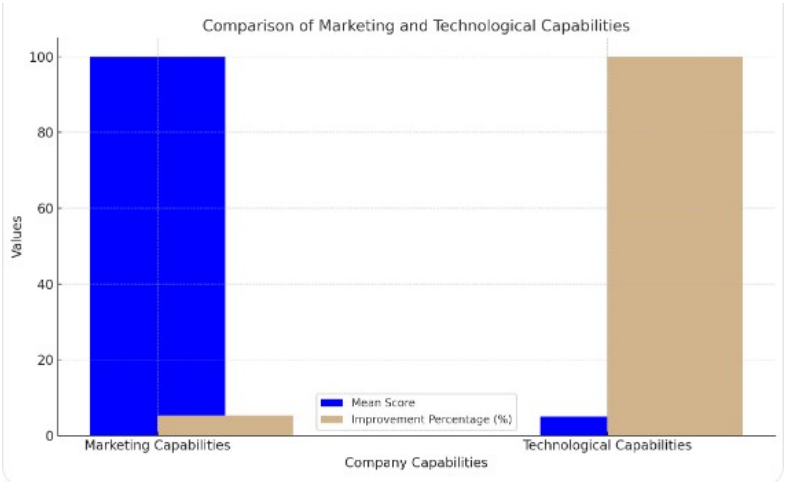

Figure 5: The Distribution of Marketing Capabilities and Technological Capabilities.

The distribution of two essential company capabilities—technological and marketing—is depicted in the fig 5. Each of these capabilities is represented by one of the two segments that make up the chart. With a rating of 5.31, the grey sector corresponds to marketing capabilities. With a rating of 5.02, the green segment denotes technological capabilities. Understanding the relative proportions of different capabilities within the company is made easier by this visual comparison, which shows that marketing capabilities are slightly more valuable than technological capabilities.

CONCLUSION

A process of the improvement of an organization's operational and dynamic skills, this study demonstrates how AI and data analytics capabilities (AIDAC) indirectly boost competitive performance. With mean ratings of 5.31 and 5.02, respectively, and improvements of 85.2% and 80.5%, our analysis revealed considerable gains in technological and marketing skills for companies with strong AIDACs. AIDAC increases the dynamic capabilities—sensing, seizing, and transforming—that are required for market adaption, according to structural equation modelling, which shows performance impacts of 82.0%, 78.3%, and 77.5%. According to CIO and IT director interviews, a strong data infrastructure, high-quality data, and a supportive organisational culture are necessary for a successful AI integration. Therefore, the true benefit of artificial intelligence (AI) and data analytics is in improving an organization's capacity for innovation and adaptation, which boosts competitive performance through enhanced dynamic capabilities.

Subsequent investigations ought to delve into the intricate processes by which artificial intelligence (AI) and data analytics capabilities (AIDAC) impact organisational capacities to augment competitive performance. Studies with a longitudinal design may shed light on how the effects of AIDAC change over time. Furthermore, a greater comprehension of the strategic importance of particular AI technologies and data analytics tools across industries may be obtained by looking into them. To maximise investments in AI and data analytics, more research might look into how AIDAC interacts with elements such as market conditions, innovation culture, and leadership styles. To improve the generalisability of findings and provide a comprehensive framework for utilising AI and data analytics for sustained competitive advantage, comparative studies across various locations and organisational sizes are recommended.

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