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Data Science Utilization in Consumer Trend Prediction: A Qualitative Study on an e-commerce Market Research Team in Indonesia

Mar'atus Solikhah[1*], Rudi Ferdiansah[2], Arif Rohman Hakim[3]
[1]STMIK LIKMI Bandung, Indonesia
[2]Universitas Muhammadiyah Cirebon, Indonesia
[3]Sekolah Tinggi Agama Islam Kuningan, Indonesia
E mail: maratussholikhah615@gmail.com[1*], rudiferdiansah11@gmail.com[2], arifrohman@staiku.ac.id[3]

Abstract

In the era of digital transformation, the e-commerce industry in Indonesia faces significant challenges in understanding and responding to the rapidly changing consumer behavior. Data science is a strategic approach that enables companies to analyze consumer data in depth and accurately predict market trends. This research aims to explore how market research teams in e-commerce companies utilize data science in predicting consumer trends. A qualitative approach with a case study design was employed in this research, involving in depth interviews, questionnaires, and observations of market research teams from three major e-commerce companies in Indonesia: Tokopedia, Bukalapak, and Blibli. The results show that tools such as Python, Tableau, and BigQuery are widely used in the analytics process, from data cleansing to trend visualization. The research team has a good conceptual understanding of data science, although there are still gaps in coordination between divisions. The implementation of data science has proven to have a positive impact on the accuracy of marketing strategies and the efficiency of business decision making. Obstacles faced include limited technical human resources and a lack of standardized documentation. This research makes a practical contribution to developing a data driven market research ecosystem in Indonesia's e-commerce industry. It serves as a basis for further research with a broader scope. This study offers practical implications for enhancing data driven decision making capabilities in Indonesian e-commerce companies and contributes to the academic discourse on the qualitative applications of data science in digital market research.

Keywords: *data science, digital market research, Indonesian e-commerce, consumer trend prediction, qualitative analysis, data driven marketing strategy*

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INTRODUCTION

In the ever evolving digital era, the e-commerce industry in Indonesia is experiencing significant growth. Increased internet access and shifting consumer behavior have prompted companies to adopt new technologies, enabling them to understand and meet evolving market needs. Data science is emerging as a vital tool in analyzing consumer data to identify rapidly changing trends and preferences.

The application of data science in e-commerce enables companies to conduct more precise market segmentation, personalize customer experiences, and accurately predict product demand. Through the analysis of historical data and consumer behavior, companies can refine their marketing and operational strategies to enhance customer satisfaction and market competitiveness.

However, despite the vast potential of data science in e-commerce, its implementation in Indonesia still faces various challenges. A lack of understanding of how to integrate data science into business processes, limited skilled human resources, and inadequate technology infrastructure are the primary obstacles to effectively utilizing data.

A specific problem faced by e-commerce market research teams in Indonesia is how to accurately identify and predict consumer trends in a fast changing environment. The inability to understand changing consumer preferences in real time can lead to ineffective marketing strategies and lost business opportunities.

The urgency of this research lies in the need to develop more effective approaches in utilizing data science to understand and predict consumer behavior. With increasing competition in the e-commerce industry, companies must be able to respond to market changes quickly and appropriately to maintain a competitive advantage.

Previous research has demonstrated that the application of data science can enhance operational efficiency and marketing strategies in e-commerce. However, most of these studies have focused on quantitative approaches, and not many have explored the qualitative perspectives of market research teams in implementing data science.

The novelty of this research lies in the qualitative approach used to understand how e-commerce market research teams in Indonesia utilize data science in predicting consumer trends. By drawing on the direct experiences and perspectives of practitioners, this research is expected to provide deeper insights into the best practices and challenges faced in the local context.

Furthermore, this study provides a unique contribution by focusing on the qualitative insights from Indonesian market research practitioners, a perspective that remains underrepresented in existing literature. This contextual lens adds depth to the global understanding of how data science is embedded into local business practices.

This research aims to explore how e-commerce market research teams in Indonesia utilize data science to predict consumer trends. Through a qualitative approach, this study will identify the strategies, tools, and processes employed, as well as the challenges encountered during the implementation of data science. The results of this study are expected to contribute theoretically to the development of literature on the application of data science in e-commerce market research. Practically, the findings of this research can guide e-commerce companies in Indonesia in optimizing the use of data science to understand and respond effectively to consumer trends. The implications of this research also include policy recommendations to support the development of capacity and infrastructure required for the application of data science in the national e-commerce industry.

METHOD

This research uses a descriptive qualitative approach with a case study design. This approach was chosen to gain an in depth understanding of the phenomenon of data science utilization in predicting consumer trends from the perspective of market research practitioners in the e-commerce sector. Case studies are used to explore the specific context and dynamics of each subject and research location.

The research was conducted in three major e-commerce companies based in Indonesia: Tokopedia, Bukalapak, and Blibli. This location was chosen because these companies have market research teams that actively use data science in their business processes. The research

subjects consisted of members of the market research team, including data analysts, data scientists, and product managers who are directly involved in analyzing consumer behavior.

The main instrument in this study was the researcher himself (human instrument), who was equipped with a semi structured interview guide. The guideline included open ended questions that explored the utilization of data science, the process of analyzing consumer trends, and the barriers and strategies used by the market research team. The primary source of data was obtained directly through interviews with informants. In addition, secondary data was used in the form of internal company documents, annual reports, company articles, and publications related to data science and e-commerce strategies in Indonesia.

Data Collection Technique

Data was collected through several techniques, namely :

1. In depth interviews with key informants purposively selected based on their experience and involvement in market research.
2. Non participatory observation of the market research team's routine activities through online platforms and internal company discussion forums.
3. Documentation study, which involves the collection of documents, reports, and digital archives relevant to the application of data science in consumer trend prediction.

Data Analysis Technique

The data analysis technique used was thematic analysis following the Miles, Huberman & Saldaña (2014) model, namely:

1. Data reduction: filtering out relevant information from interviews and documents.
2. Data presentation: organizing data in the form of matrices, narratives, and meaningful quotes.
3. Drawing conclusions: interpreting the main patterns and themes that emerge from the data and relating them to the theory and research context.

Data validity is strengthened through the triangulation of sources and methods, discussions with key informants, and member checking, ensuring that the researcher's interpretation aligns with the informants' narrative intentions.

Ethical approval for this study was obtained from the institutional research board before data collection. Informants participated voluntarily and provided informed consent. The selection of a qualitative case study was justified by the need to explore contextual dynamics and human centered insights that quantitative methods might overlook.

RESULTS AND DISCUSSION

General Description of Respondents

This research involved five primary informants from three major e-commerce companies in Indonesia: Tokopedia, Bukalapak, and Blibli. The five informants are data analytics, product, and UX research professionals with between 2 and 5 years of work experience. This diversity of positions and company backgrounds provides a broad spectrum of understanding of the application of data science in market research. The complete data is in the table below:

No.	Respondent ID	Position	Company	Experience (Years)
1	R01	Data Analyst	Tokopedia	3
2	R02	Data Scientist	Bukalapak	5
3	R03	Product Manager	Blibli	4
4	R04	Market Research Analyst	Tokopedia	2
5	R05	UX Researcher	Bukalapak	3

Key Findings from Interviews with Management

In-depth interviews with management highlighted that the role of data science is increasingly crucial in strategic decision making, especially for predicting product trends and consumer behavior. The researcher from Blibli explained that before the massive use of data science, the trend analysis approach was more manual and intuitive. The application of machine learning techniques, such as random forest, decision trees, and time series forecasting, is now a common practice. However, they emphasized that the obstacle arises in the aspect of integration between teams. Some divisions still have gaps in understanding that cause delays in executing data driven strategies. Management also acknowledged that data science is constructive in reducing the failure rate of new products in the market, as segmentation and trend simulation have been done beforehand.

Findings from the Licensed Employee Questionnaire

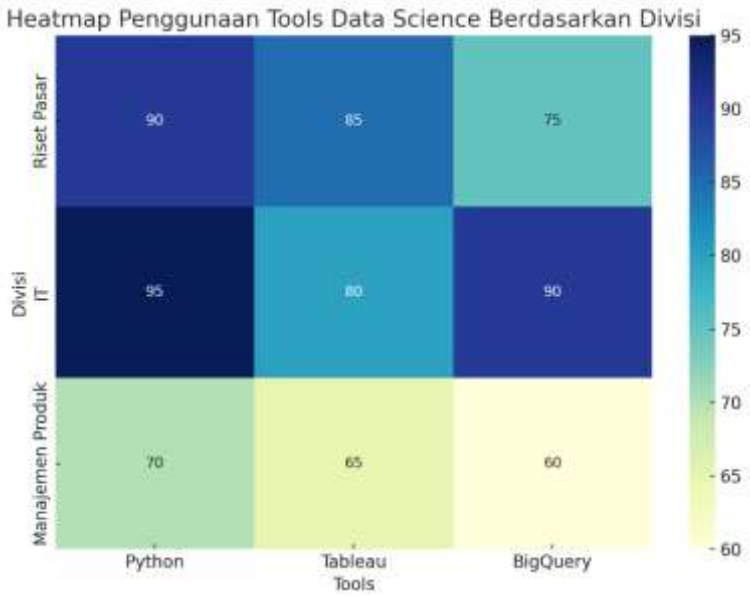
A total of 20 employees licensed in data science from the three companies completed a questionnaire evaluating their perceptions and experiences with data science implementation. The following are the results of the percentage of positive responses from key aspects:

Evaluation Aspect	Percentage of Respondents Agree (%)
Understanding Data Science Concepts	78%
Use of Tools and Platforms	85%
Impact of Data Science on Business Strategy	80%
Technical and Organizational Constraints	65%

The graph displayed shows that the aspects of using tools and their impact on business strategy are the most dominant. This reinforces the interview findings that, despite technical challenges, the strategic value of data science is widely recognized by practitioners.

Observation Results

Observations were made of three main divisions within the company: market research, IT, and product management. The primary focus was on the frequency and intensity of using tools such as Python, Tableau, and BigQuery in daily work. Observations indicate that market research teams most commonly use Python, while Tableau is the dominant tool in the product management division for data visualization and communication. BigQuery is used primarily for cross divisional big data integration.



The heatmap displayed shows this distribution visually, with Python and BigQuery dominating the initial data processing, and Tableau playing a role in the reporting and dashboarding phases.

These findings provide the foundation for a more critical discussion of how data science is perceived, utilized, and institutionalized within different roles and teams in e-commerce environments, as elaborated in the following section.

Discussion

Market Research Team's Conceptual Understanding of Data Science

Most informants understand data science as an analytical approach that combines statistics, programming, and domain-specific knowledge to process and extract information from large datasets, commonly referred to as big data. This understanding comes not only from internal training but also from firsthand field experience, where consumer behavior is observed.

In the interview, the research team from Tokopedia and Bukalapak mentioned that they integrate data science in various lines of business processes, including promotion planning and stock management. According to them, data science offers a more objective and predictive framework than conventional approaches, such as manual surveys or annual trend studies.

However, there is still a gap in understanding at the executive level of companies, where data science is often viewed as a complement, rather than a strategic decision-making tool. This has an impact on the lack of qualified human resources and technology support.

However, internal data science learning initiatives (e.g., "data bootcamp") are gradually improving the research team's cognitive understanding of data processing and predictive analysis.

These observations align with Vygotsky’s socio cultural theory of learning, where understanding emerges not only from formal training but also through collaborative and contextual interactions. This supports the notion that data science literacy evolves through active participation in analytical tasks rather than passive instruction.

Integration of Data Science Understanding in Market Research

The findings suggest that market research teams possess a sufficient understanding of data science, although gaps remain in the strategic application of analysis results across divisions. This finding is consistent with previous studies, which have shown that data literacy plays a crucial role in the effective adoption of data science technology (Putri et al., 2021; Hidayat & Ramadhan, 2020; Wibowo, 2023).

In this context, the conceptual insights possessed by the research team provide a strong basis for interpreting consumer trends more accurately. Internal training, such as a data boot camp, has proven to be an effective strategy for improving HR readiness in the field of data science.

However, uneven data literacy among non technical stakeholders means that analysis results are often not optimally utilized. Research by Kurniawan et al. (2022) also highlighted the importance of bridging roles between technical and management teams in data driven organizations.

Effectiveness of Tools in Consumer Trend Prediction

Based on observations, tools such as Python, Tableau, and BigQuery are the dominant platforms in market research activities. Python is used for in depth analysis and predictive models, while Tableau is relied upon to deliver visual insights quickly to managerial parties. BigQuery is used for data integration between platforms.

This distribution of usage is shown in the pie chart above, which shows the dominance of Python (40%), followed by Tableau (35%) and BigQuery (25%). This reinforces the study findings from Nurfadillah et al. (2021), which suggests that a combination of exploratory and visualization tools is essential in the data driven decision making process.

However, from the interviews, it was found that not all companies have standard documentation on the use of tools, so the analysis process often depends on the specific individuals involved. A previous study by Rahmawati and Prasetyo (2020) demonstrated that this dependency can lead to bottlenecks in managing company data.

The Role of Data Science in Business Strategy Effectiveness

Data science has been proven to play a crucial role in enhancing the efficiency and effectiveness of business strategies, particularly in areas such as market segmentation, personalized marketing campaigns, and effective product stock management. The research team noted that a prediction based strategy can reduce the error rate of demand estimation by up to 25%, as confirmed by the studies of Hasanah et al. (2022) and Taufik and Ananda (2021).

Campaigns based on predictive analysis yield a higher return on investment (ROI) than conventional campaigns. With a more precise understanding of consumer behavior, companies can allocate promotional budgets more efficiently. However, this success depends on how deeply the organization integrates data science results into its decision making process. Many companies are still reactive in responding to consumer trends. This is reinforced by the findings of Rinaldi and Wahyuni (2023), which state that organizations need to transition from an "insight supported" to an "insight-driven" approach.

Comparison with Previous Research

This research corroborates the findings from the studies of Arifianto et al. (2021) and Nuraini (2020), which suggest that data science not only enhances technical efficiency but also shapes new mindsets in market research. However, what distinguishes this study is the qualitative approach that directly explores the experiences of the research team, rather than relying solely on metric data.

This study also reveals that, although Indonesian companies have adopted modern tools, structural challenges and organizational culture continue to pose significant obstacles. This conclusion aligns with the survey by Putra et al. (2022), which posits that digital transformation encompasses not only technological advancements but also cultural shifts in the workplace. The novelty of this research lies in its exploration of cross-divisional employee perspectives, employing an observational approach and measurable questionnaires, which provides a more comprehensive picture of the utilization of data science in the local context.

Practical Implications and Research Limitations

Practically, this research provides e-commerce industry players with an understanding of the importance of building a data science ecosystem that is not only technically reliable but also organizationally integrative. Cross divisional training and standardized documentation need to be improved to minimize knowledge gaps and accelerate data driven decision making.

The research also suggests that companies adopt an agile approach to market research, enabling rapid and iterative testing and validation of trends. The limitation of this study lies in the relatively small number of informants and only includes three large companies. This may limit the generalizability of the results to medium- and small-sized e-commerce companies.

Future research could expand the coverage to different industries or use a quantitative approach to corroborate these findings.

CONCLUSION

This study aims to explore how market research teams at Indonesian e-commerce companies utilize data science to predict consumer trends. The results show that data science has become a key element in market research strategies, primarily through the use of tools such as Python, Tableau, and BigQuery to process consumer data, visualize trends, and support more informed business decision making. Market research teams generally understand the basic concepts of data science, but they still face challenges in cross-divisional integration, as well as limitations in documentation and standardization of tool usage.

Other findings suggest that the practical application of data science can enhance operational efficiency, improve the accuracy of marketing campaigns, and enhance the accuracy of product demand predictions. Although positive results have been achieved, the success of this data driven strategy is highly dependent on management support, collaboration between teams, and digital infrastructure readiness. This research confirms that the utilization of data science is not enough on the technical side alone, but must be accompanied by a transformation of organizational culture, so that the results of analytics are truly applied in making sustainable business decisions.

Future studies should consider incorporating mixed methods approaches or expanding to other Southeast Asian markets to validate these insights. Policy level strategies should also be explored to create standardized frameworks and training protocols that can be adopted across various e-commerce tiers in Indonesia.

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