Use of Big Data Technology in Improving the Quality of Business Decision Making in the Marketplace

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Abstract. This research aims to investigate the use of Big Data technology in enhancing business decision-making in the marketplace environment. The research method used is descriptive qualitative through literature review, involving analysis of various literature sources. The research findings indicate that Big Data technology has played an increasingly important role in improving the quality of decision-making for business actors in the marketplace. Among these roles are Big Data's ability to analyze consumer behavior, more accurate market segmentation, price optimization, and market trend detection. Big Data enables stakeholders to make timelier, informed, and evidence-based decisions. However, challenges related to data privacy and security management also need to be considered in the implementation of Big Data technology in the marketplace environment, including the complexity and volume of large data sets; data quality and security; technical constraints such as difficulties in integrating data sources, complex technology infrastructure, and challenges in real-time data analysis; as well as user privacy concerns. By understanding these challenges, this article suggests several steps that companies can take to optimize the use of Big Data technology in business decision-making in the marketplace. By overcoming these barriers, companies can take more appropriate steps in facing increasingly tight and dynamic market competition.

Keywords: Big Data, Business Decision, Marketplace

1 Introduction

Economic development in Indonesia consistently shows significant improvement from year to year. Initially, Indonesian people were actively involved in buying and selling activities in traditional markets or through direct face-to-face transactions, which involved exchanging goods or services using money as a legal means of payment. However, most of the buying and selling activities that were previously concentrated in conventional markets have moved to online markets. This change marks progress in Indonesia's market economy.[1] Technological developments that continue to increase significantly will have a broad impact on various aspects of human life. One example is the integration of technology in people's daily activities. Technological innovation brings various new conveniences that fundamentally change the business landscape. This innovation aims to simplify various activities, from the simplest to the most complex. For example, in terms of product or goods accessibility, users of modern smartphone devices can download applications, fill in personal data, and carry out verification,

ICLSSEE 2024, May 25, Jakarta, Indonesia

DOI 10.4108/eai.25-5-2024.2348981

enabling them to carry out online transactions through various available digital marketplace platforms.[2]

In the rapidly developing digital era, marketplaces have become one of the dominant business models in electronic commerce. Marketplaces provide a platform where sellers and buyers can meet, interact and make transactions online. As the number of internet users grows and online shopping habits increase, marketplaces are becoming the center of attention for companies looking to expand their market reach. Marketplaces adapt principles similar to traditional markets in offline trading.[3] Like conventional markets, marketplaces provide a platform for individuals who want to buy and sell goods or services. The difference is, while in traditional markets there is direct interaction between sellers and buyers in physical locations, in marketplaces, all transactions are carried out online without any direct meetings between the two parties. Apart from that, in traditional markets, sellers generally have to pay rental fees for their selling space, but in the marketplace context, there are no rental fees that must be borne by sellers.

Desy Wijaya, in her book, reveals that selling on marketplaces comes with both advantages and disadvantages. Among the advantages of selling on marketplaces are minimal capital requirements, almost negligible initial investment, easy setup process, the ability to sell a wide range of products, promotional support from the marketplace platform, reduced concerns about losing customers, higher levels of buyer trust, and the ability to monitor business growth continuously. On the other hand, the disadvantages of selling on marketplaces include intense competition, dependence on marketplace management, sporadic market conditions, and limited branding opportunities.[3]

In increasingly fierce competition in the marketplace, business stakeholders are faced with various challenges that require effective decision making. The success of a business on a marketplace platform is not only determined by the quality of the products offered, but also by the company's ability to make the right decisions based on a deep understanding of market dynamics, consumer trends, and proven effective strategies. To overcome these challenges, companies must have the capacity to continuously monitor and understand consumer behavior, and be able to adapt to dynamic market changes. Thus, companies can improve their market understanding and increase opportunities to increase sales volume and profits.

Big Data technology is emerging as a potential solution to improve business decision making in the marketplace. The term "Big Data" is a new term that originates from the need for large companies, such as Yahoo, Google, and Facebook, to analyze large amounts of data.[4] In general, big data is a collection of large amounts of complex data that cannot be managed efficiently by current data processing technologies. In detail, the definition of the Big Data concept was presented by Doug Laney and Gartner who explained Big Data through three Vs, namely volume (size of data), velocity (speed of data entering and leaving), and variety (description of sources and types of data).[5] Later, IBM and Microsoft added veracity (data reliability) as the fourth V and McKinsey & Co. Completing the definition of Big Data with value (the hidden value of insight) as the fifth V.[6] Big Data refers to immense and complex data sets that can be analyzed comprehensively to gain valuable insights. By collecting, managing and analyzing data from various sources, marketplaces can generate relevant and accurate information to sustain better decision making.

Although the potential of Big Data technology in improving business decision making has been widely recognized, deeper research into its application in the marketplace environment is

still limited. Therefore, this research aims to fill this knowledge gap by investigating the use of Big Data technology in the marketplace context, specifically in increasing the effectiveness of business decision making. By understanding the role and impact of Big Data technology in the marketplace environment, it is desired that this research can provide a valuable contribution to business stakeholders, researchers and practitioners in the field of electronic commerce to optimize their decision-making strategies and improve their business performance in dynamic and competitive online market.

2 Methods

This research employs a descriptive qualitative approach with a literature review method to investigate the use of Big Data technology in enhancing business decision-making in the marketplace environment. The qualitative approach is utilized to gain an in-depth understanding of the phenomenon under investigation, while the literature review method allows the researcher to gather, analyze, and synthesize findings from various literature sources related to the research topic.

2.1 Data Sources

Data for this study were collected through a literature review from various literature sources, including academic journals, books, research reports, and other relevant online sources concerning the use of Big Data technology in the marketplace context.[7] Relevant data were identified based on pre-defined inclusion criteria, which include recent publications, high-quality research, and relevance to the research topic.

2.2 Data Analysis

The collected data were then analyzed qualitatively using a descriptive approach. The analysis process involved comprehensive reading and understanding of the content of selected literature sources. Important information, findings, and patterns related to the use of Big Data technology in business decision-making in the marketplace were identified and recorded.

From the analysis results, conclusions were drawn inductively by identifying common patterns, themes, and trends emerging from the data. Conclusions were drawn by comparing and contrasting various findings from different literature sources and evaluating the implications of these findings in the context of business decision-making in the marketplace. The conclusions drawn are descriptive in nature and supported by evidence existing in the literature. This research method allows researchers to gain a deep understanding of the role and impact of Big Data technology in the marketplace environment, and to generate informative and relevant conclusions to enrich knowledge in this field.

3 Discussion and Result

3.1 The Role of Big Data Technology in Decision-Making in the Marketplace

1. Consumer Behavior Analysis

With technological advancements such as Building Information Modeling (BIM), Internet of Things (IoT), and Big Data Technology playing a key role in understanding consumer behavior in the marketplace environment. By utilizing data obtained from various sources, such as online interaction traces, purchase history, and product reviews, companies can identify patterns and trends that influence consumer purchasing decisions.[8] This analysis enables companies to tailor marketing strategies, target more precise market segmentation, and develop more relevant product offerings. Through transaction history, customer behavior can be identified to reveal which product combinations are frequently purchased.

Enhancing User Experience

With Big Data analysis, companies can better understand consumer preferences and habits. It allows them to enhance the user experience on their marketplace platforms by providing relevant product recommendations, customized display settings, and more efficient customer service. For example, when a user searches or reviews a product, the system can automatically suggest other products that may pique their interest based on previous purchase patterns or preferences identified from previous interaction data.

2. More Accurate Market Segmentation

Through Big Data, businesses can perform more accurate market segmentation. By gaining a deeper understanding of the different needs and preferences among diverse consumer segments, businesses can tailor their marketing strategies to match the characteristics of each segment.[9] Thus, they can enhance their marketing effectiveness and achieve greater profits. In other words, leveraging Big Data in market segmentation allows businesses to target markets more efficiently, leading to increased sales and sustainable business growth.

3. Optimization of Price and Product Offerings

Through Big Data analysis, businesses can better understand consumer sensitivity to pricing, competitor purchasing behavior, and market demand. By effectively utilizing this information, they can set optimal prices for their products and adjust promotional offerings more precisely. Consequently, businesses can enhance their profitability and strengthen their competitive position in the market. Big Data provides opportunities for businesses to respond to market dynamics more rapidly and accurately, thereby enabling them to maximize outcomes and gain sustainable competitive advantages.

4. Market Trend Detection and Demand Prediction

Market conditions can change rapidly, and the use of Big Data is expected to assist in quickly detecting market trend changes. Changes in market trends are often triggered by changes in consumer purchasing behavior. Additionally, according to research by Maryanto, Big Data also plays a significant role in managing online business reputation. Tools available in Big Data enable sentiment analysis, allowing businesses to evaluate how positively or negatively feedback received by their businesses.[10]

Big Data analysis also enables companies to detect emerging market trends and forecast future demand. By understanding consumer purchasing patterns, changes in product preferences, and other factors influencing demand, companies can take appropriate steps to align their strategies with market changes.

Product Innovation

Big Data can also serve as a source of inspiration for new product innovations. Big Data can be used to identify products most favored by consumers and help companies plan future products that align with market trends.[11] By analyzing market trends and customer feedback, companies can identify new opportunities to develop products that meet consumer needs and desires. It may involve adjusting existing products, launching new products, or developing additional features that enhance the user experience.

3.2 Challenges in Implementing Big Data Technology in the Marketplace

1. Complexity and Volume of Data

   The main challenge faced by companies in the marketplace environment is the complexity and vast volume of data generated. The data encompasses various aspects such as customer transactions, online interactions, product reviews, and much more. Managing and analyzing such data requires robust technological infrastructure and high scalability. In addressing these challenges, companies need to build systems capable of efficiently processing and storing data, as well as possessing the ability to comprehensively analyze data to gain valuable insights. Additionally, it is crucial for companies to continuously develop and update their technology to remain relevant and capable of coping with the increasing data growth in the future. By having the right infrastructure and technology, companies can harness the vast potential of marketplace data to support better decision-making and more effective business strategies.

2. Data Quality and Security

   The quality and reliability of data are crucial in Big Data analysis. Inaccurate or incomplete data can lead to incorrect conclusions and result in improper decisions. Therefore, companies need to ensure that the data used in the analysis is accurate, complete, and trustworthy. To address these challenges, companies need to implement strong measures in data management. It includes the implementation of rigorous data validation processes, continuous data quality monitoring, and the implementation of robust security systems to protect data from external and internal threats. Additionally, it is important to have clear policies and procedures regarding data collection, storage, and usage, as well as involving training and awareness for relevant staff to ensure compliance and proper understanding of data security standards.

3. Technical Challenges

   The implementation of Big Data in the marketplace environment also faces technical challenges. These include data integration from various sources, real-time data processing, and managing complex technological infrastructure. Companies

need to ensure that their systems can integrate and process data quickly and efficiently.

Difficulty Integrating Different Data Sources

Difficulty integrating different data sources is one of the main challenges in data analysis in the marketplace environment. Data from various sources such as sales transactions, user interactions, product reviews, and demographic information often have different formats or structures. It can complicate the process of merging and analyzing data efficiently.

To address this challenge, companies need to have a strong and flexible data integration strategy. It involves developing systems or platforms that can connect and unify data from various sources with different formats. Additionally, implementing standards or protocols for data collection and storage can also help facilitate the data integration process. Besides technology, collaboration between technical teams, data analysts, and business stakeholders is also important in facing this challenge. Good collaboration among various departments within the company can ensure that the integrated data meets overall business needs and objectives.

Complexity of Technological Infrastructure

The complexity of technological infrastructure is one of the major challenges in implementing Big Data in the marketplace environment. The use of Big Data requires a strong and complex infrastructure, which includes the use of specialized hardware and software. This includes powerful servers, scalable data storage systems, and sophisticated data analytics platforms.

Building and managing this infrastructure require significant financial investment and high technical skills. Companies must be prepared to allocate sufficient resources, both in terms of finance and human resources, to build and maintain technological infrastructure that meets their Big Data analysis needs. Additionally, with technology constantly evolving, companies also need to keep up with the latest developments in Big Data technology to remain relevant and competitive. This may involve additional costs to upgrade or enhance existing infrastructure.

Difficulty in Real-Time Data Analysis

In a rapidly changing marketplace environment, the need for real-time data analysis becomes increasingly important. The ability to gain timely insights and respond quickly to market changes can be a key factor in business success. However, the challenges faced in analyzing real-time data lie in the complexity of managing continuous data streams and ensuring accuracy and speed in the analysis process.

To address these challenges, companies need to invest in technology and architectures that can support real-time data analysis effectively. This involves using systems that can access and process data quickly, as well as having the capacity to manage large volumes of data in a short time. Technologies such as streaming processing and in-memory databases can be the right solutions to meet these needs. Additionally, companies need to have skilled and trained teams in analyzing real-time data. This involves training and developing skills in using real-time data

analysis technology, as well as a deep understanding of the market and consumer trends.

4. User Privacy

   The use of Big Data in the marketplace environment carries risks related to the security and privacy of user data. Sensitive data from customers, such as personal information and transaction history, must be tightly guarded against unauthorized access or misuse. To address these challenges, companies must prioritize data protection and adopt appropriate security measures.

   Business entities must comply with applicable data privacy regulations, such as GDPR in the European Union or CCPA in California, as well as other relevant local regulations. This involves a deep understanding of regulatory requirements and the implementation of appropriate procedures to ensure compliance. Additionally, companies should implement technical security measures, such as data encryption, two-factor authentication, and continuous security monitoring. Service providers should be carefully chosen to ensure that their systems meet high security standards. User education and awareness are also important in maintaining data privacy. Companies should provide clear information on how user data will be used and managed, as well as offer clear options for privacy controls to users.

4 Conclusion

In the dynamic marketplace environment, the utilization of Big Data technology holds significant potential to enhance business decision-making and marketing strategies. By collecting, managing, and analyzing data from various sources, companies can gain valuable insights into consumer behavior, market trends, and product preferences. However, in implementing Big Data technology, companies face various challenges that necessary to be addressed.

The primary challenges include the complexity and large volume of data, data quality, and security, as well as difficulties in integrating different data sources. Additionally, the complexity of technology infrastructure, challenges in analyzing real-time data, and the need to safeguard user privacy are also factors that need to be considered. To overcome these challenges, companies need to invest in robust technology infrastructure, implement stringent data security measures, and develop effective data integration strategies. It is also crucial to prioritize compliance with data privacy regulations and increase user awareness of the importance of data privacy.

By addressing these challenges, companies can harness the significant potential of Big Data technology to enhance the effectiveness of business decision-making, respond quickly to market changes, and strengthen their competitive position in an increasingly dynamic and competitive marketplace environment.

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