

Big Data Analysis to Improve the Competitiveness of Micro, Small, and Medium Enterprises (MSMEs)

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ABSTRACT

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Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in the global economy, but often face challenges in competing in complex markets. Effective data management is key to improving the competitiveness of MSMEs, where Big Data analytics promises great potential. Big Data analytics enables MSMEs to gain in-depth insights into customer behavior, market trends, and better business decisions. However, the implementation of Big Data in MSMEs is not free from challenges such as limited human and technical resources. This study uses the Systematic Literature Review (SLR) method to investigate the implementation of Big Data in improving the competitiveness of MSMEs. The results show that the benefits of Big Data for MSMEs include deeper market understanding, improved business decisions, operational efficiency, personalization of customer experiences, and detection of risks and opportunities. Strategies to overcome these challenges include increasing access to finance, skills development, technology utilization, collaboration, and regulatory compliance. It is also important to pay attention to data security and privacy, with policy implications such as providing access and training, developing policy frameworks, industry and academic collaboration, increasing awareness, and financial support. With proper implementation and adequate policy support, MSMEs can leverage the potential of Big Data to increase their competitiveness in an increasingly complex and dynamic market.

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INTRODUCTION

Micro, Small and Medium Enterprises (MSMEs) play a vital role in the global economy, contributing significantly to job creation and economic growth. However, MSMEs often face challenges in their efforts to compete in an increasingly complex and changing market. One of the key aspects in enhancing the competitiveness of MSMEs is effective data management. In this context, Big Data analytics emerges as a potential tool that can help MSMEs optimize their operations, understand market trends, and make better decisions.

Big Data Analytics is the process of collecting, processing, and analyzing large amounts of diverse data to gain valuable insights. By leveraging advanced technologies and algorithms, Big Data Analytics enables SMEs to identify previously unseen patterns in their data, providing relevant information for better decision making.

One of the main advantages of Big Data analytics for MSMEs is its ability to provide deep insights into customer behavior, product preferences, and market trends. By better understanding customer needs and wants, MSMEs can develop more effective marketing strategies and products that are more in line with the market. In addition, Big Data analysis can also help MSMEs manage their supply chains more efficiently. By analyzing data related to raw material procurement, production, and distribution, MSMEs can identify potential efficiencies and reduce their operational costs.

However, despite its great potential, the implementation of Big Data analysis in the context of MSMEs also poses a number of challenges. One of the main challenges is the limited human and

technical resources owned by MSMEs in managing and analyzing data. Therefore, a holistic and planned approach is needed to successfully implement Big Data analysis among MSMEs.

In this context, this study aims to investigate how Big Data analysis can be applied effectively in improving the competitiveness of MSMEs. Through this study, it is expected to find the best strategies and practices for implementing Big Data analysis in MSMEs and supporting the growth and sustainability of the MSME sector as a whole.

METHOD

This study uses the Systematic Literature Review (SLR) method, which refers to a rigorous research approach used to collect and evaluate research related to a particular topic in a particular field or discipline (Xiao & Watson, 2019). This method is used to systematically identify and analyze related literature with the ultimate goal of advancing a deeper understanding of the chosen subject matter. The SLR process involves conducting a comprehensive investigation that encompasses multiple objectives, such as identifying, examining, evaluating, and interpreting all existing research in the domain of interest, with a specific focus on relevant research questions (Okoli & Schabram, 2015).

RESULTS AND DISCUSSION

Benefits of Big Data Analysis for MSMEs

- a. **Deep Market Insights:** Big Data analytics enables MSMEs to gain a deeper understanding of their market. By analyzing data on consumer behavior, purchasing trends, and customer preferences, MSMEs can identify new opportunities, adjust marketing strategies, and develop products or services that better suit market demand.
- b. **Improved Business Decisions:** With access to large and diverse data, MSMEs can make better and more informed business decisions. Big Data analytics helps MSMEs identify patterns, trends, and business opportunities that might have been missed through traditional means. This enables them to make smarter decisions in terms of inventory management, pricing, and marketing strategies.
- c. **Higher Operational Efficiency:** By analyzing operational data, MSMEs can identify areas where efficiency can be improved. For example, Big Data analytics can help in more efficient supply chain management, optimization of production processes, and better scheduling to increase productivity and reduce operational costs.
- d. **Personalizing Customer Experience:** Big Data analytics enables SMEs to provide a more personalized and tailored customer experience. By understanding individual customer preferences and behavioral patterns, SMEs can tailor products, services, and promotions to meet each customer's needs and wants more accurately.
- e. **Risk and Opportunity Detection:** Big Data Analytics enables MSMEs to detect risks and opportunities more quickly and accurately. By analyzing market data, competition, and other external factors, MSMEs can respond proactively to changing market conditions and take appropriate steps to mitigate risks or capitalize on emerging opportunities.

Implementation of Big Data Technology in MSMEs

- a. **Comprehensive Data Collection:** MSMEs can collect data from various sources, including sales transactions, online customer interactions, social media data, and other internal data. Comprehensive data collection is the first step in implementing Big Data technology.
- b. **Data Processing and Analysis:** Big Data technology enables MSMEs to process and analyze large volumes of data quickly and efficiently. This includes using data analysis algorithms such as machine learning and predictive analytics to identify patterns, trends, and insights that can be used for decision making.
- c. **Data Analytics Platforms:** MSMEs can use data analytics platforms that are specifically designed for their needs. These platforms typically have a user-friendly user interface and provide data visualization tools that allow MSMEs to explore and understand their data better.

- d. **Predictive Analysis and Data Filtering:** By implementing Big Data technology, SMEs can perform predictive analysis to predict market trends, customer behavior, or other future events. They can also use data filtering techniques to extract relevant and valuable information from large volumes of data.
- e. **Supply Chain Optimization:** Big Data technology can be used to optimize the supply chain of MSMEs by analyzing inventory data, customer demand, and supplier performance. This can help MSMEs reduce operational costs, increase efficiency, and avoid unnecessary inventory shortages or excess inventory.
- f. **Marketing and Service Personalization:** By analyzing customer data, SMEs can personalize their marketing and service strategies for each customer. This includes providing tailored product recommendations, relevant promotional offers, and an overall more satisfying customer experience.
- g. **Data Security:** When implementing Big Data technology, it is important for MSMEs to pay attention to data security. They need to adopt best practices in data protection, such as data encryption, restricted access, and monitoring data activities to protect their customers' and business' sensitive information.

Challenges Faced by MSMEs

- a. **Access to capital:** One of the main challenges for MSMEs is access to sufficient capital to start or grow their businesses. Banks are often reluctant to lend to MSMEs due to the perceived high risk.
- b. **Financial management:** Many MSMEs face difficulties in managing their finances efficiently, including issues such as recording transactions, budget planning, and cash management.
- c. **Market access:** Competing in a crowded market can be challenging for MSMEs, especially when it comes to reaching new customers and building a strong brand.
- d. **Competition with large companies:** MSMEs often have to compete with large companies that have greater resources, including in terms of price, marketing and distribution.
- e. **Regulations and bureaucracy:** Complex regulations and heavy bureaucracy can be obstacles for MSMEs, whether in terms of setting up a business, obtaining permits, or fulfilling tax requirements.
- f. **Human resources:** Attracting and retaining a quality workforce can be a challenge for SMEs, especially when competing with larger companies that can offer better wages and benefits.
- g. **Technology and innovation:** Adoption of technology and innovation is often a challenge for MSMEs due to limited resources and the technological knowledge required.
- h. **Market changes:** MSMEs must be able to adapt to market changes, consumer trends, and technological developments to remain relevant and competitive in a changing market.

Strategies to Overcome Challenges

- a. **Improving Access to Finance:** MSMEs often struggle to gain access to capital to grow or expand their businesses. Strategies to address this include approaching financial institutions that provide credit specifically for MSMEs, crowdfunding, or partnering with investors.
- b. **Skills Development:** Many MSMEs operate in a competitive and ever-changing environment. Improving management, marketing, and financial skills can help MSMEs compete more effectively. This can be done through training, workshops, or mentorship programs.
- c. **Leveraging Technology:** Adopting technology can help MSMEs improve operational efficiency, manage inventory, improve marketing, and reach a wider market. This strategy can include using business management software, e-commerce platforms, or social media.
- d. **Collaboration with Other MSMEs:** MSMEs can support and strengthen each other through collaboration and partnerships. This can be in the form of consortiums for joint procurement, marketing collaboration, or resource sharing.
- e. **Compliance with Regulations and Standards:** MSMEs must ensure that they comply with applicable regulations and standards, especially those related to product or service quality,

taxes, and licensing. This requires a good understanding of the relevant legal and regulatory requirements.

- f. **Product or Service Diversification:** By offering a variety of products or services, MSMEs can reduce the risks associated with market fluctuations or changes in consumer trends. This strategy allows MSMEs to stay relevant and competitive in a changing market.
- g. **Strengthening Brand Image:** Building a strong brand image can help MSMEs differentiate themselves from competitors and increase customer loyalty. Focusing on quality, reliability, and good customer service can help strengthen brand image.
- h. **Networking and Relationship Building:** Expanding your network of contacts and business relationships can open doors to new opportunities, partnerships, and valuable resources. SMEs can leverage networking events, industry communities, and online platforms to build their networks.
- i. **Flexibility and Responsiveness to Change:** MSMEs must be able to adapt quickly to changes in the market, technology, or policies. Good flexibility and responsiveness can help MSMEs survive and thrive in a dynamic environment.
- j. **Risk Management:** Understanding and managing risk is an essential part of running a business. SMEs need to have a clear strategy for identifying, assessing and managing risks associated with their operations, including financial, operational and reputational risks.

Data Security and Privacy

- a. **Education and Awareness:** SMBs need to be aware of the importance of data security and privacy and the risks associated with its breach. Internal education and training on best practices in maintaining data security and privacy can help raise awareness across the organization.
- b. **Policies and Procedures:** MSMEs must have clear policies and procedures related to data management and protection. This includes policies related to data collection, data access, data storage, and data sharing with third parties. These policies must comply with applicable regulations and be applied consistently.
- c. **Device and Network Security:** Protecting devices and networks from cyberattacks is a critical step in maintaining data security. SMBs should use up-to-date security software, such as firewalls, antivirus, and antispyware, and ensure that their devices and software are updated regularly.
- d. **Data Encryption:** Encrypting data while it is stored or transmitted over a network can help protect sensitive information from unauthorized access. SMBs should consider using encryption to protect their data, especially customer data or financial transactions.
- e. **User Access Management:** SMBs should limit access to sensitive data to only those employees who need it to perform their jobs. This can be achieved by implementing strict access controls, including the use of strong passwords, two-factor authentication, and role-based access restrictions.
- f. **Security Incident Management:** SMBs need to have an emergency response plan to handle data security incidents, such as data breaches or malware attacks. This plan should include steps to evaluate, respond to, and recover from security incidents as efficiently as possible.
- g. **Security Audits and Assessments:** Conducting regular security audits can help SMBs identify security gaps and improve their security systems. This can involve internal audits or using a third-party service to conduct an independent evaluation of the security system.
- h. **Regulatory Compliance:** SMBs must ensure that they comply with all relevant regulations related to data security and privacy, such as GDPR in the European Union or HIPAA in the United States. This includes implementing certain practices and reporting data breaches when they occur.
- i. **Secure Use of Cloud Services:** If SMEs use cloud services to store or process data, they should choose a service provider that has strong security and ensures that their data is stored and handled securely.

- j. Customer Education: SMBs can also educate their customers about the importance of data security and how to protect their personal information when interacting with the business.

Policy Implications and Recommendations:

- a. Deep Data Analysis: Big Data implementation allows MSMEs to analyze data in depth, including customer behavior, market trends, and potential market needs. This can help them make more timely and accurate decisions.
- b. Improved Operational Efficiency: By collecting and analyzing their operational data, MSMEs can identify areas where they can improve efficiency, reduce production costs, and increase productivity.
- c. Personalized Customer Service: Big Data enables SMEs to understand individual customer preferences and respond to them in a more personalized manner. This can increase customer satisfaction and build loyalty.
- d. Better Product and Service Development: Data analytics can help MSMEs better understand market trends and customer needs, which in turn allows them to develop more tailored products and services.
- e. Data Security: Policy implications must address data security. MSMEs need to ensure that their data is protected from cyberattacks and misuse, and comply with applicable data protection regulations.

Policy recommendations to support Big Data implementation in MSMEs may include:

- a. Providing Access and Training: The government can provide access to affordable Big Data infrastructure and tools for MSMEs, as well as provide training to help them understand and use the technology.
- b. Policy Framework Development: Create a clear and supportive policy framework to protect data security and privacy, and provide incentives for MSMEs to adopt Big Data technologies.
- c. Industry and Academic Collaboration: Encourage collaboration between MSMEs, the technology industry, and academic institutions to develop Big Data solutions that suit the needs of MSMEs.
- d. Awareness Raising: Conduct awareness campaigns to educate MSMEs about the benefits and risks of Big Data, and how best to integrate it into their operations.
- e. Financial Support: Providing financial support or fiscal incentives to MSMEs investing in Big Data technologies and related infrastructure.

CONCLUSION

The benefits of Big Data Analytics for MSMEs are enormous, bringing deeper understanding of the market, more timely and accurate business decisions, higher operational efficiency, personalized customer experience, and faster detection of risks and opportunities. The implementation of Big Data technology requires steps such as comprehensive data collection, efficient data processing and analysis, use of data analytics platforms, and a focus on personalization and supply chain optimization. Challenges faced by MSMEs include access to capital, financial management, market access, competition with large companies, and various regulatory and technological barriers. Strategies to overcome these challenges include increasing access to finance, skills development, utilization of technology, collaboration with other MSMEs, and regulatory compliance. In addition, data security and privacy are also important focuses, with policy implications that include providing access and training, developing a clear policy framework, industry and academic collaboration, increasing awareness, and financial support. With proper implementation and adequate policy support, MSMEs can harness the potential of Big Data to increase their competitiveness in an increasingly complex and dynamic market.

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