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The Implementation of Machine Learning on MSMEs Product Sales in Indonesia: A Systematic Literature Review

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Abstract.
Micro, Small, and Medium Enterprises (MSMEs) are crucial in Indonesia. They contribute significantly to employment absorption and can be initiated with minimal capital. However, this does not imply that MSMEs are without potential challenges. They often face difficulties in capturing markets and implementing professional management practices. This is why technological assistance is needed within this sector. One anticipated technical aid is the application of Machine Learning as a marketing tool. This aligns with the characteristics of Machine Learning, which has long been instrumental in various businesses. This research employs the systematic literature review method to explore how Machine Learning can help MSMEs. Findings based on the SLR demonstrate that Machine Learning not only aids in marketing but also enhances operational efficiency.

Keywords: *MSMEs, Machine Learning, Artificial Intelligence, Indonesia*

1. Introduction

MSMEs are an important element in the Indonesian economy (Subagyo & Hery Purnomo, 2022). This is because MSMEs are a business sector that can be done by many people, based on small or even micro capital, and capable of absorbing a lot of labor. By considering this, MSMEs deserve the attention of the Indonesian government.

However, at the same time, the development of MSMEs is hampered by various problems. One of the problems that MSMEs often face is the fact that MSMEs often have difficulty marketing due to limited costs (Fithri et al., 2022; The development of MSMEs as critical engines for the national economy continues to receive government support - Coordinating

Ministry for Economic Affairs of the Republic of Indonesia, n.d.). Not only that, MSMEs also experience limited knowledge in carrying out business innovations. With these conditions, it is not surprising that many MSMEs experience setbacks and even bankruptcy.

Considering this condition, there needs to be an effective, efficient, and fast solution. One solution that was then proposed was the use of technology. One of the technologies used is Machine Learning. It is hoped that the use of Machine Learning can improve marketing in the future (Malakauskas & Lakštutienė, 2021; Welte et al., 2020).

To understand the effectiveness of Machine Learning, the author conducted research using the Systematic Literature Review method. The target of using SLR is to find consensus regarding the role of Machine Learning in marketing. Based on the results of the research that has been carried out, the efficiency and effectiveness of Machine Learning for MSMEs will be obtained.

This research is original research based on monitoring on Google Scholar and Scopus Index. This is the first research to use the SLR model to obtain conclusions from research on Machine Learning-based marketing.

2. Research Methods

The research method uses the SLR (Systematic Literature Review) system with three-tiered questions, which is a systematic approach to investigating the literature available in a particular domain. In this case, the research focuses on the relationship between Marketing, MSMEs, and Machine Learning. The following is a description of each research question (RQ) along with the steps taken:

RQ1: Are there keywords Marketing, MSMEs, and Machine Learning?

Process and Procedures:

1. **Determination of Search Scope:** Determination of clear inclusion and exclusion criteria for literature that will be used as research objects.
2. **Identifying Keywords and Synonyms:** Identify main keywords such as "Marketing", "MSMEs", and "Machine Learning". Include synonyms or related terms such as “Small and Medium Enterprises,” “Digital Marketing,” and “Artificial Intelligence.”
3. **Use of Search Engines and Scientific Databases:** Use of search engines and scientific databases such as Google Scholar, PubMed, or IEEE Xplore to conduct searches using identified keywords.
4. **Literature Selection and Assessment:** Review of search results and selection of literature that meets the inclusion criteria. Examination of the abstract and title to ensure relevance to the topic.
5. **Data Analysis and Compilation:** Analyze selected literature, record key findings, and classify them based on themes and relationships between Marketing, MSMEs, and Machine Learning.

RQ2: Does it discuss the relationship between Machine Learning and MSMEs?

Procedure:

1. **Identifying Literature that Discusses Relationships**: Focusing on the section that discusses the relationship between Machine Learning and MSMEs. Identify relevant findings or information regarding interactions between the two fields.
2. **Relationship Analysis and Assessment:** Evaluation of insights or findings related to how Machine Learning impacts or interacts with MSMEs.

RQ3: What is the impact of Machine Learning and MSMEs on the research results?
Procedure:

1. **Positive and Negative Impact Analysis:** Identify the positive and negative impacts of using Machine Learning in the MSME context.
2. **Conclusion and Implications:** Discussion process and implications of these findings for the MSME industry and potential for future development.

3. Results and Discussion

3.1. Artificial Intelligence and Machine Learning

The development of Artificial Intelligence or AI, also known as artificial intelligence, has entered a new phase. Now, AI development is starting to be utilized in various fields and is not only limited to experimental materials (Paschen et al., 2020; van Berkel et al., 2022).

As AI develops, new ideas emerge for commercial use. Some examples that we often see are the use of Chat GPT which is often used as a reference or instrument for writing purposes. Apart from that, AI is also used to produce visual products such as posters and comics. Thus, we can say that AI has been developed in such a way and other possibilities continue to be explored for purposes in various fields (Goanta, 2023; Monteith et al., 2022).

One of the AIs that is currently gaining attention is Machine Learning which literally means machine learning (citation). The function of Machine Learning was initially to provide competition for chess athletes. However, in its development, it was discovered that there were other possibilities that we had not yet tapped into. This possibility is the use of Machine Learning for marketing purposes (Haenlein & Kaplan, 2019).

This is possible because Machine Learning placed on social media can collect some crucial data to understand the target market (Hair Jr & Sarstedt, 2021; Miklosik & Evans, 2020). The simplest thing is of course search history. After search history, of course, the next most important thing is time spent, which means how long someone is on a page and this shows an indication of how much interest they have in an item. Furthermore, Machine Learning can also learn how people react to a post. The more reactions given, the more interested the person is in that thing. This allows Machine Learning to learn to target audiences for marketing and then create specific commercial advertisements for certain markets or individuals. Of course, the result obtained is efficient and effective advertising to reach the desired market.

The use of Machine Learning was controversial when Donald Trump ran for president of the United States for the first time (Heawood, 2018; Hinds et al., 2020). At that time, Donald Trump hired the services of Cambridge Analytica, a political consulting company in the United States, to use Machine Learning to create campaign products according to voter preferences. For example, Machine Learning learns that a person has an Islamophobia problem, and then the political campaign advertisements that appear on his social media homepage show that Donald Trump has a strong anti-Islam policy. On the other hand, if there are parties who are worried about racism, then the advertising campaign that appears will also show that Donald Trump is anti-racism. This made Donald Trump win the election. But

at the same time, this also raises ethical questions when using Machine Learning for political purposes, for example,

In general, there are three main types of Machine Learning. The three types are as follows:

1. **Supervised Learning:** Models in supervised learning provide labels or data that are included in machine learning. This is to help direct machine learning to learn certain systems needed for the expected output.
2. **Unsupervised Learning (Unsupervised Learning):** In this model, learning is carried out without any labels or giving specific credit. After that, this learning process is allowed to run so that it can then provide realistic results in planning the expected commercial products.
3. **Reinforcement Learning:** Models in reinforcement learning learn by interacting with their environment. The model is given positive or negative feedback based on the actions it takes, so it learns to choose actions that optimize certain goals.

Through this learning model, it is hoped that machine learning will have an impact in the form of commercial products that can compete and compete.

3.2. Development and Challenges of Indonesian MSMEs

The definition of MSMEs can be found in Law Number 20 of 2008. In this law, MSMEs are defined as micro, small, and medium enterprises, with regulated criteria. Some of the criteria for MSMEs are as follows:

1. **Micro business**:
    - Have assets up to a maximum of IDR 50 million (excluding land and buildings).
    - Has an annual sales turnover of up to a maximum of IDR 300 million.
2. **Small business**:
    - Have assets above IDR 50 million to a maximum of IDR 500 million (excluding land and buildings).
    - Has an annual sales turnover of above IDR 300 million to a maximum of IDR 2.5 billion.
3. **Medium Business**:
    - Have assets above IDR 500 million to a maximum of IDR 10 billion (excluding land and buildings).
    - Has an annual sales turnover of above IDR 2.5 billion to a maximum of IDR 50 billion.

In Indonesia, MSMEs, most of which are household businesses, play an important role in reducing unemployment (Abdurohim, 2023). In 2019, there were 65.4 million MSMEs which absorbed 123.3 thousand workers. The contribution of MSMEs to National GDP reached 60.5%, showing great potential for economic growth. The advantages of MSMEs include businesses that are easy to imitate, do not require complex skills, and do not require high education. Because of this, MSMEs are a suitable form of business to absorb the large number of workers in Indonesia and most of whom do not yet have a sufficient level of professionalism.

MSMEs can also be said to be the embodiment of the Pancasila economy (Kian & Sabri, 2021; Nugroho, 2018). This is because the parties involved in MSME businesses are not large capital holders. MSMEs are businesses where even people who have limited capital can start

a business. In fact, they can borrow funds at very low interest. Through MSMEs, not all products or product manufacturing elements have to be centralized in one business. This makes things easier because it creates collaboration instead of domination. As we know, the capitalist economy emphasizes control over the joints of production from raw materials to finished goods. Meanwhile, MSMEs are based on cooperative cooperation because later there will be parties who make raw materials, production materials, semi-finished materials, and up to the finished goods level. This is the advantage of MSMEs in fulfilling the values of Pancasila compared to other businesses.

Regarding the important role of MSMEs, the government has provided support through the KUR program and Micro Business Distribution, proving the importance of financial assistance for business development. The government's focus and support for MSMEs are important to advance the general welfare and overcome the problem of unemployment in Indonesia, in accordance with state objectives as regulated in the 1945 Constitution of the Republic of Indonesia.

3.3. The Relationship between Machine Learning and MSMEs

The use of Machine Learning will make it easier to market MSME products. Machine Learning makes it easier for MSMEs to ensure their products reach markets that have not previously been achieved. By using Machine Learning (Hair Jr & Sarstedt, 2021), MSMEs will get more space to ensure that their products attract the attention of the right market share. However, Machine Learning is an efficient and effective means of learning so this also helps MSMEs not to spend more time because Machine Learning already works much more effectively for them.

Through Machine Learning, there are five expected objectives, namely:

1. **More Precise Market Segmentation**: Machine Learning allows MSMEs to better analyze consumer data. Machine learning algorithms can identify patterns in consumer behavior and analyze their preferences. The result is more accurate market segmentation. MSMEs can understand potential customer profiles better, allowing them to target marketing strategies more efficiently (Fauzan et al., 2023).
2. **Prediction of Demand and Consumer Behavior**: By utilizing Machine Learning, MSMEs can predict future demand for their products. Machine Learning algorithms can analyze historical data and market trends to make more accurate estimates of how much demand there will be for a product at any given time. This allows MSMEs to manage their production and inventory more efficiently (Abdillah Fahad, 2021).
3. **Personalization and Product Recommendations**: Machine Learning can help MSMEs provide a more personalized experience to customers. Based on individual user data, algorithms can provide relevant product recommendations. For example, if a customer has purchased product A, Machine Learning can recommend product B which is often purchased simultaneously by other customers.
4. **Price and Offer Optimization**: Machine Learning algorithms can help MSMEs determine optimal prices for their products. Analysis of market and competition data can provide the insight needed to set competitive yet profitable prices. Additionally, MSMEs can use Machine Learning to customize special offers and promotions according to customer preferences (Farahdiba, 2020).

5. **Customer Sentiment and Feedback Analysis**: Machine Learning can be used to analyze customer reviews and feedback. This allows MSMEs to understand in more depth how their products are received by the market. If there are negative trends, they can react immediately and make necessary improvements.
6. **Advertising Campaign Optimization**: Machine Learning can help in optimizing MSME advertising campaigns. Algorithms can select the most effective platforms, messages, and targeting based on user data and previous campaign results.
7. **Competition Analysis and Market Trends**: By using Machine Learning to thoroughly analyze market data, MSMEs can gain insight into market trends and competitor strategies. This allows them to adapt their products and marketing strategies according to changing market needs.
8. **Operational Efficiency**: By automating analysis and decision-making tasks, MSMEs can save time and resources. This allows for greater focus on product innovation and business development.

Table 1. Literature Review on The Application of Machine Learning

No.	Title	Author	Summary	Information
1.	Application of Machine Learning in MSME Product Sales: Literature Study.	(Hindrayani et al., 2021)	Solving MSME problems using Machine Learning covers many things. Not only related to marketing but even to solving production problems	Fulfill All Research Questions
2.	Smart Manufacturing Management System Utilizes Big Data and Machine Learning Algorithms for MSME Production.	(Iskandar et al., 2021)	The use of Machine Learning can be utilized to produce products that suit customer desires through the use of Big Data and Machine Learning.	
3.	Sentiment Analysis of Reviews of Sales of MSME Products in Nias Regency with a Comparison of Machine Learning Classification Algorithms.	(Harahap et al., 2021)	The use of Machine Learning helps develop sales of MSME products in Nias.	
4.	Smart Manufacturing System Management System Utilizing Big Data and Machine Learning Algorithms for MSME Production	(Fathoni & Bhrata, 2022)	The smart manufacturing era requires the application of big data technology and artificial intelligence in manufacturing systems. Data generated during the manufacturing process requires analysis to be used statistically. Machine	

			learning is an integral part of artificial intelligence that provides analysis, recommendations, and predictions. The application of this technology is not only relevant for large companies but is also important for MSMEs in the manufacturing industrial sector.
5.	Comparison of Machine Learning Classification Algorithms in Sentiment Analysis Product Review of North Padang Lawas Regency	(Yennimar & Rizal, 2019)	The growth of MSMEs in Indonesia increases by 6% every year thanks to support from the government and private institutions that provide training and business assistance. However, there are still challenges such as the inability of MSMEs to adopt information technology and limited internet access in rural areas. Many also lack digital and technological skills. Understanding customer needs and providing consistent service is critical.
6.	Analysis of MSME Income During the Transition Period from Pandemic to Endemic Through Social Media Traffic	(Masjudin et al., 2022)	*Machine Learning is* used to process survival plans for MSMEs so that they are able to solve various MSME problems.
7.	Confirmation Analysis and Classification of Indicators Driving the Competitiveness of MSME Supply Chains in Rural Areas	(Mayasari & Afiatna, 2022)	*Machine Learning* can help increase success in rural MSMEs based on the principles of the route of transportation, lead time of suppliers,

			variation of inventory, the utility of facilities, and purchase quantity of suppliers.
8.	Data Science Training for MSMEs in Tasikmalaya City Using Google Colab.	(Guntar, 2023)	*Machine Learning* assists education for MSMEs, especially in Tasikmalaya City.
9.	Sentiment Analysis of Social MSME Sales Reviews Through Media with Crowdtangle during the Covid19 Pandemic	(Ridho et al., 2023)	Based on Machine Learning, sales of MSME products can be maximized.
10.	Predicting Student Entrepreneurial Competence using the AdaBoost Classifier Machine Learning Classification Method.	(Ikhsan et al., 2021)	Student competency abilities in entrepreneurship can be measured using Machine Learning, namely the AdaBoost Classifier.

3.4. Discussion

Machine Learning has proven useful in increasing the efficiency and effectiveness of Micro, Small, and Medium Enterprises (MSMEs). This means that by implementing Machine Learning technology, MSMEs can do their work faster and more effectively. This can be seen from research results which show that Machine Learning opens up the market and cuts the time previously focused on market research. Meanwhile, we already know that market research is the most difficult and complex part of the process of encouraging products to reach markets that have not been well tapped so far. With this, we can say that Machine Learning has solved the main problem that has been an obstacle to market development for MSMEs.

Not only that, Machine Learning is not only useful in the field of marketing but also as a tool for partners or business associates. This shows that Machine Learning technology has a variety of applications beyond marketing strategy, and can be used to support various aspects of business. Several studies even mention the function of Machine Learning for business education. Things that may have been difficult to imagine before. Machine Learning at the same time becomes a holistic solution that can bring progress to the business sector and not only function as marketing efficiency but also management efficiency.

In the long run, Machine Learning can be used even to manage employees, which is often considered a difficult task. This shows that this technology can help in optimizing human resource management in an organization. It turns out that even from existing research, employee settings can take advantage of Machine Learning. In this way, business efficiency can reach a very high level. In the future, this will provide many benefits.

In the future, the development of Machine Learning technology will become increasingly complex. This indicates that progress and innovation in the field of Machine Learning will continue, perhaps with new developments in algorithms or computing infrastructure. The most important thing right now is the ethical regulation of the use of Machine Learning so

that the use of Machine Learning does not violate existing ethics. Ethical violations can cause problems in the business world and actually have a negative impact.

4. Conclusion

The use of Machine Learning in Micro, Small, and Medium Enterprises (MSMEs) can have a significant positive impact. However, as with any technology or strategy, there are also risks involved. The following are several considerations regarding the positive impacts and risks of using Machine Learning in MSMEs based on the literature review research we conducted.

(1) Improving Marketing Quality, by utilizing Machine Learning we will enjoy progress in the marketing field. It will be easier for people to get information and use that information to their advantage, especially in reaching markets that have so far not been able to tap in due to the limitations of MSMEs.

(2) Increased Operational Efficiency: What was never expected was that Machine Learning could help automate repetitive tasks and data analysis, increasing efficiency in MSME operational processes. However, the most surprising thing is Machine Learning's ability to learn new things and help with management assistance which is not limited to just marketing but also operations and other things.

(3) Business Decision Optimization: By using Machine Learning algorithms, MSMEs can optimize business decisions based on relevant and accurate data so that in the end they will produce results as expected.

(4) Improved Customer Experience: By utilizing Machine Learning for customer behavior analysis, MSMEs can provide a more personalized and satisfying experience.

(5) Improved Predictions and Forecasting: Machine Learning enables MSMEs to make more accurate predictions regarding market trends, product demand, and other factors affecting business.

(6) Product and Service Development: By analyzing consumer data, MSMEs can understand market needs and develop more appropriate products or services.

However, negatively, the use of Machine Learning can be used for negative things. For this reason, the use of Machine Learning should not be misused. The benefits and risks involved must be carefully calculated, as well as ensuring that the use of Machine Learning is based on the resources and knowledge required for effective management. With a careful approach, this technology can become an invaluable tool to help MSMEs grow and compete in an increasingly competitive market.

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