

Development of An Artificial Intelligence-Based Model To Improve Digital Marketing Effectiveness For Tempe Chips MSME A.M.J

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Abstract.

Micro, Small, and Medium Enterprises (MSMEs) in the food sector increasingly use digital channels to reach consumers, yet many still rely on general promotion strategies that are not supported by systematic customer data analysis. This study aims to develop an artificial intelligence (AI)-based digital marketing model for Tempe Chips MSME A.M.J by combining customer segmentation, promotional content optimization, transaction-flow support, and chatbot-assisted interaction in a web-based prototype. The study employed a Research and Development approach with prototyping stages consisting of problem identification, data requirement analysis, system design, prototype implementation, and limited functional validation. The prototype was designed to support product presentation, product detail exploration, shopping cart management, checkout, invoice generation, WhatsApp-based payment confirmation, and chatbot-based customer assistance. The result indicates that the proposed model can organize digital marketing activities into an integrated customer journey from product discovery to order confirmation. The main contribution of this study is a practical AI-oriented framework for MSME digital marketing that links customer data processing with web-based sales support. However, the current validation remains functional and descriptive; conversion-rate improvement still requires longitudinal testing using real campaign analytics, customer interaction logs, and comparative pre- and post-implementation measurements.

Keywords: Artificial Intelligence, Digital Marketing, MSME, Customer Segmentation, Tempe Chips and Chatbot.

I. INTRODUCTION

MSMEs are a strategic pillar of Indonesia's economy and have become a major target of national digital transformation programs [1], [2]. Government and institutional reports indicate that Indonesia continues to prioritize MSME digitalization because digital channels can expand market reach, improve transaction efficiency, and strengthen competitiveness. In practice, however, digital adoption does not automatically produce effective marketing outcomes. Many small businesses already publish product information through social media, marketplaces, or simple websites, but their campaigns are often not guided by customer segmentation, behavioral data, or measurable conversion indicators.

Tempe chips represent a traditional food product with strong local identity and market potential. For MSME A.M.J, digital marketing is important not only for product promotion but also for building customer trust through clear product information, convenient ordering, direct communication, and fast payment confirmation. The research proposal identifies a central problem: promotional reach may increase through digital platforms, but sales conversion remains limited when content is generic and audience targeting is weak. This condition reflects a common gap in MSME digital marketing, namely the absence of data-driven mechanisms for understanding customer behavior and aligning promotional messages with customer preferences.

Artificial Intelligence offers a relevant solution because it can process customer interaction data, identify patterns, support automatic segmentation, and recommend promotional strategies. In marketing, AI is frequently associated with personalization, predictive analytics, content automation, and customer service support [4], [5]. For MSMEs, the challenge is not merely adopting complex AI algorithms, but translating AI capability into a lightweight, usable, and affordable marketing system that fits the operational capacity of small businesses.

This study therefore develops an AI-based model and web prototype for improving the digital marketing effectiveness of UMKM Keripik Tempe A.M.J. The article focuses on three research objectives: (1) to formulate an AI-oriented digital marketing model for customer segmentation and promotional support; (2) to develop a web-based prototype that integrates product display, ordering, WhatsApp confirmation, and

chatbot assistance; and (3) to evaluate the functional contribution of the prototype to the MSME digital customer journey. The study is positioned as a prototype-development article rather than a full causal experiment, because longitudinal transaction analytics and campaign conversion data have not yet been collected at scale.

II. METHODS

Research Design

This study used a Research and Development (R&D) method with a prototyping approach. The approach was selected because the target system is an applied information system that must be iteratively adjusted to MSME business needs. The development process consisted of five stages: problem identification, data collection and requirement analysis, model and system design, prototype implementation, and limited functional validation [9].

The research object was UMKM Keripik Tempe A.M.J, a home-industry food business that requires a more structured digital marketing mechanism. The proposed model was designed to support the transition from manual and general promotion toward data-driven marketing. The prototype was implemented as a web-based system to make the solution accessible through commonly available devices and to reduce the implementation burden for MSME users.

Proposed AI-Based Digital Marketing Model

The proposed model consists of six interconnected layers: (1) data acquisition from customer interactions, product views, orders, and chat inquiries; (2) data preprocessing through cleaning, normalization, and integration; (3) customer segmentation using demographic, behavioral, and transactional features; (4) content and campaign recommendation based on segment characteristics; (5) web-based transaction and customer service support; and (6) evaluation through marketing performance indicators such as reach, engagement, conversion rate, order frequency, and customer response time [6], [7], [11].

In the initial prototype, the AI component is formulated as a model architecture and functional service concept. The practical implementation emphasizes chatbot-assisted interaction and structured transaction data capture, while the advanced predictive model for customer segmentation and conversion optimization is prepared for subsequent training once sufficient interaction and campaign data are available.

Table 1. AI-based Digital Marketing Model Components

Component	Input Data	Processing Mechanism	Expected Marketing Output
Customer data acquisition	Website visits, orders, chat questions	Log capture and transaction recording	Structured customer interaction dataset
Segmentation model	Customer behavior and order history	Clustering or classification model	Audience groups for targeted promotion
Content recommendation	Product category, customer interest, campaign history	Rule-based and machine-learning recommendation	More relevant digital promotional content
Chatbot assistance	Frequently asked questions and product inquiries	Natural-language response template and intent mapping	Faster response and improved customer service
Transaction support	Cart, checkout, invoice, WhatsApp confirmation	Web-based transaction workflow	Lower friction from interest to order confirmation
Evaluation dashboard	Engagement, order, and conversion indicators	Descriptive analytics and comparison over time	Evidence-based marketing improvement

Prototype Development and Functional Validation

The website prototype was reviewed using the documentation of the developed AMJ Tempe Chips website. The observed pages include the homepage, product list, product detail, shopping cart, checkout, order success and invoice page, WhatsApp payment confirmation, and chatbot assistant interface. Validation was conducted by mapping each feature to its intended contribution to the digital marketing customer

journey. Because analytics data from live campaigns were not provided, the validation focused on functional completeness, user-flow continuity, and the readiness of the system to collect future marketing data.

III. RESULT AND DISCUSSION

Flowchart of Research Step

The research procedure is illustrated in Figure 1.

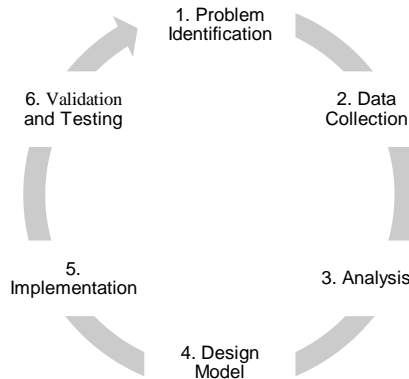


Fig 1. Research step

The diagram shows an iterative Research and Development (R&D) flow. The research flow consists of six main stages: problem identification, data collection, analysis, model design, implementation, and validation/testing. The process begins by identifying the main digital marketing problems faced by UMKM Keripik Tempe A.M.J, especially the need for a more effective and data-driven promotional strategy. Relevant data are then collected from business observations, product information, customer interaction needs, and website features.

After data collection, the information is analyzed to determine system requirements and opportunities for AI-based digital marketing support. The next stage is designing the model, which includes the structure of the website, customer interaction flow, product catalog, shopping cart, checkout process, WhatsApp payment confirmation, invoice generation, and chatbot assistant. The designed model is then implemented into a working web-based prototype.

Finally, validation and testing are conducted to evaluate whether each feature works properly and supports the research objectives. The circular form of the diagram indicates that this process is iterative, meaning that the system can be revised and improved based on testing results.

Use case Diagram Customers

The use case diagram customers is illustrated in Figure 2.

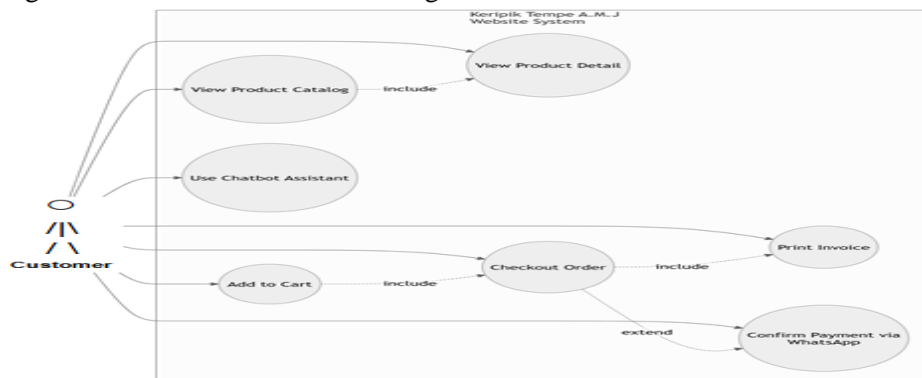


Fig 2. Usecase Diagram for customer

The customer use case diagram describes the main activities performed by customers in the Keripik Tempe A.M.J website system. Customers can access the product catalog to view available products and continue to the product detail page to obtain more complete information about each product. This process helps customers compare products before making a purchase decision.

However, the chatbot should be further evaluated using intent-detection accuracy, response relevance, fallback rate, and customer satisfaction before it is claimed to improve conversion.

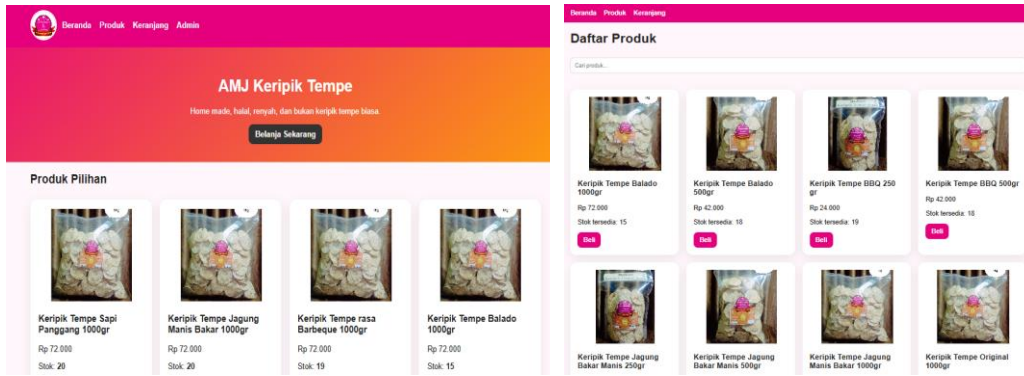


Fig. 4 Homepage and Product list page of the AMJ Tempe Chips website prototype.



Fig. 5. Product detail page supporting customer evaluation.



Fig. 6 Shopping cart page before checkout

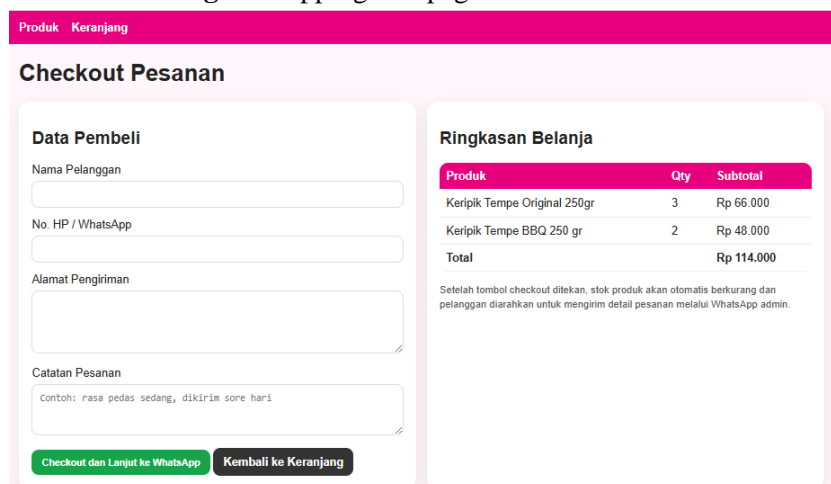


Fig. 7 Checkout form for order submission.



Fig. 8. Successful order page and invoice printing feature and WhatsApp-based payment confirmation flow

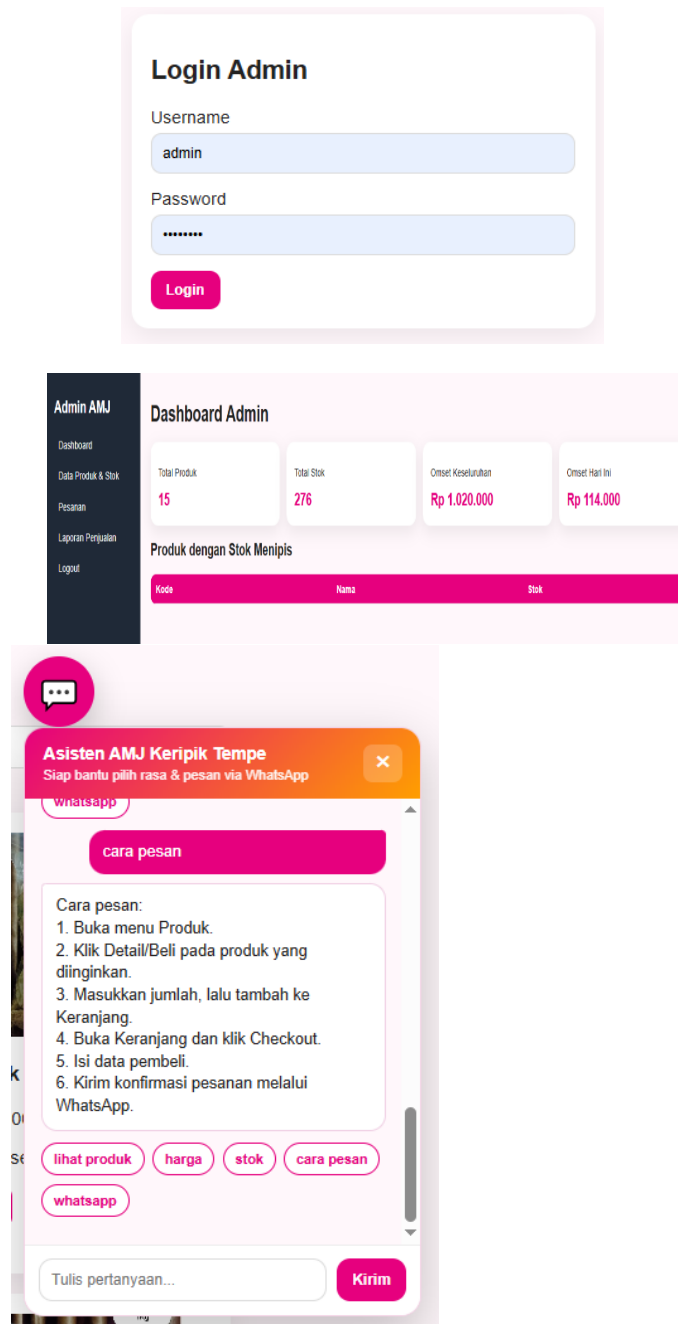


Fig. 9 Chatbot assistant interface for customer support and dashboard login admin

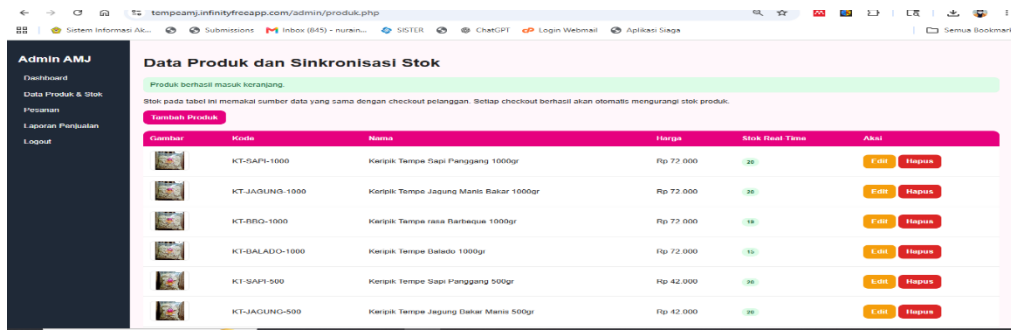


Fig. 10 Dashboard manage product by admin

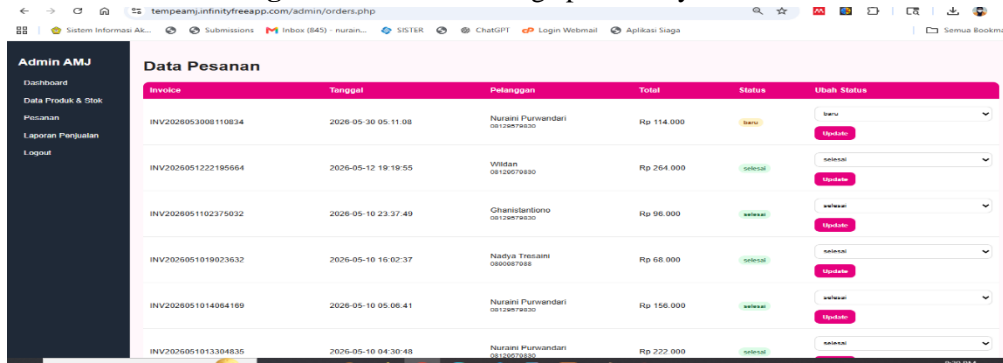


Fig. 11 Dashboard manage order by admin

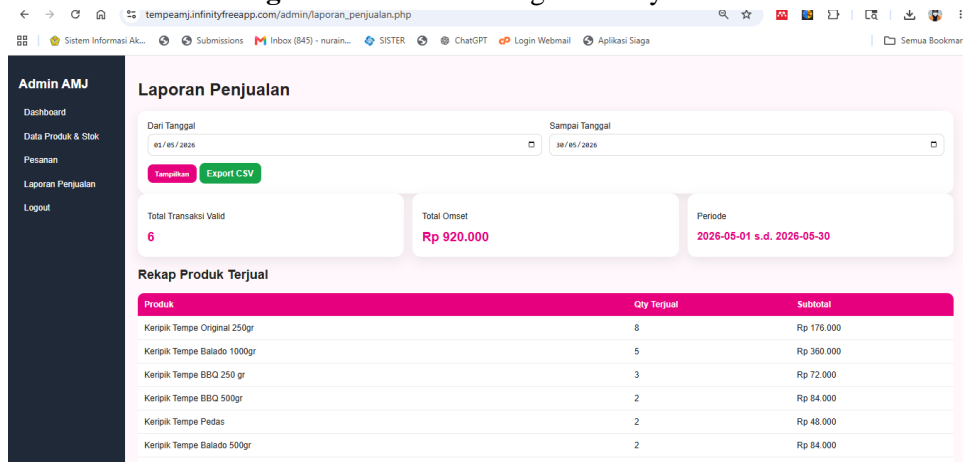


Fig. 12 Dashboard sales report by admin

Functional Mapping of Prototype Features

The prototype features can be interpreted as a functional foundation for AI-enabled marketing. Product pages generate product-interest signals, cart and checkout pages generate purchase-intention signals, the invoice feature creates transaction records, WhatsApp confirmation supports human-assisted closing, and chatbot conversations can generate customer-intent data. When these data are stored consistently, they can support segmentation, campaign evaluation, and future recommendation models.

Table 2. Functional contribution of website features to digital marketing effectiveness

Website Feature	Marketing Function	Potential Captured	Data AI Development Potential
Homepage	Brand awareness and navigation	Visit frequency and entry path	Landing-page optimization
Product list	Product discovery	Product impressions and clicks	Product interest clustering
Product detail	Customer evaluation	Viewed product attributes	Preference prediction
Shopping cart	Purchase intention	Selected products and quantities	Basket analysis
Checkout	Order conversion	Customer and order data	Conversion prediction

Invoice	Transaction documentation	Order completion status	Customer value analysis
WhatsApp confirmation	Human-assisted closing	Confirmation and payment intent	Response-time optimization
Chatbot assistant	Customer service and engagement	Questions, intents, unresolved cases	Intent classification and FAQ optimization

IV. DISCUSSION

The main strength of the proposed model is its alignment with the operational reality of MSMEs. Instead of requiring a complex enterprise marketing platform, the model begins with a website-based transaction and communication system that can gradually accumulate customer data. This incremental approach is appropriate for small businesses because AI implementation depends on the availability, quality, and continuity of data. Without structured data capture, customer segmentation and campaign optimization would remain speculative.

The prototype also addresses a practical weakness in many MSME digitalization efforts: the separation between promotion, ordering, and customer communication. If promotion happens on social media but ordering happens manually through chat without transaction records, the business has limited evidence for evaluating marketing effectiveness. By integrating product information, cart, checkout, invoice, WhatsApp confirmation, and chatbot assistance, the prototype creates a more coherent data path. This data path is a prerequisite for more advanced AI models such as customer segmentation, purchase-intent prediction, and personalized promotion recommendation.

Nevertheless, there is a methodological limitation that should be acknowledged. The current result does not yet prove that AI increases sales conversion because no controlled experiment, A/B testing, or longitudinal campaign analytics were available. Therefore, the article should not claim a measured improvement in conversion rate. A stronger future evaluation should compare pre-implementation and post-implementation indicators, including website traffic, click-through rate, cart-to-checkout ratio, checkout completion rate, WhatsApp confirmation rate, completed payment rate, repeat order rate, and chatbot resolution rate.

Data governance is also important. Customer interaction data, order records, and chatbot logs may contain personal information. The system should therefore include consent notices, secure data storage, access control, and a data-minimization policy. Ethical AI issues such as bias in segmentation, excessive personalization, and misleading automated promotion should also be controlled. These considerations are essential if the model is later expanded into a fully automated AI marketing platform.

V. CONCLUSION

This study developed an AI-oriented digital marketing model and web prototype for UMKM Keripik Tempe A.M.J. The proposed model integrates customer data acquisition, segmentation, content recommendation, chatbot assistance, transaction support, and performance evaluation into a single digital marketing workflow. The website prototype demonstrates functional readiness through homepage presentation, product catalog, product detail, shopping cart, checkout, invoice generation, WhatsApp confirmation, and chatbot customer assistance.

The contribution of this study lies in translating AI-based marketing concepts into a practical system architecture for a food-sector MSME. The prototype can serve as a foundation for future customer data collection and AI model training. However, the current study remains limited to prototype development and functional validation. Future research should conduct empirical evaluation using real customer data, campaign analytics, and controlled comparison before and after AI-based intervention. Recommended metrics include conversion rate, customer engagement, chatbot accuracy, repeat purchase, average order value, and marketing cost efficiency.

VI. ACKNOWLEDGMENTS

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