



ShopTips: Design and Development of an AI-Based Web Application for Automating E-Commerce Product Marketing Content

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Abstract— The rapid growth of e-commerce has prompted sellers to produce compelling product descriptions quickly and efficiently. However, many sellers lack the copywriting skills needed to craft persuasive marketing content from raw product specifications. This research aims to design and implement ShopTips, an AI-powered web application that transforms product data into ready-to-use marketing content. The system was developed using a web-based architecture consisting of an HTML/CSS/JavaScript frontend, a Node.js with Express.js backend, MongoDB as the database, and an external AI API for natural language generation. The development methodology followed the Waterfall model, encompassing requirement analysis, system design, coding, testing, and evaluation phases. ShopTips enables users to input product details such as name, category, description, specification, target market, and sales platform. The system then generates persuasive product descriptions, Unique Selling Points (USPs), SEO keywords, call-to-action phrases, social media captions, and a multi-dimensional content quality score encompassing clarity, persuasion, SEO, and emotional dimensions. In addition, the application provides structured feedback to help users refine and improve their content iteratively, making it a practical tool for both novice and experienced sellers. The system is also designed with a simple and user-friendly interface to ensure ease of use and accessibility for micro, small, and medium enterprises (MSMEs). Functional testing using black-box methods showed that all eight primary endpoints operated as intended without critical errors. User acceptance testing with 30 respondents yielded a satisfaction score of 85.6%, indicating high acceptability and usability. The findings demonstrate that the application significantly reduces the time required to produce marketing content while improving overall content quality. Therefore, ShopTips can serve as an effective solution for sellers who lack advanced writing skills and need efficient content generation tools. Future research may explore user authentication, export features, direct marketplace integration, and competitor analysis functionality to further enhance system capabilities and scalability.

Keywords— e-commerce; artificial intelligence; content marketing; web application; copywriting automation; SEO.

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I. INTRODUCTION

The development of electronic commerce (e-commerce) in Indonesia in recent years has experienced substantial growth, reflecting broader global trends in digital retail. According the value of Indonesia's e-commerce market is projected to reach USD 82 billion by 2025, positioning it among the largest and fastest-growing e-commerce markets in Southeast Asia [1]. This rapid expansion is fueled by several factors, including increased internet penetration, widespread smartphone adoption, growing digital literacy, and the convenience offered by online shopping platforms. Consequently, businesses of varying scales, from micro and small enterprises to large corporations, are increasingly relying on marketplace platforms as their primary distribution channels to reach a wider audience. The use of these platforms not only facilitates sales but also

provides greater visibility and potential access to national and international consumer bases [2].

However, success in online marketplaces is influenced by more than just the inherent quality of products. The quality of marketing content presented to potential buyers plays a critical role in shaping consumer perceptions and purchasing decisions. Well-crafted product descriptions, strategic use of keywords for search engine optimization (SEO), and clear communication of product benefits have been shown to significantly affect online purchasing behavior. Research conducted indicates that 64% of online consumers actively read product descriptions before making a purchase, while 72% of respondents stated that the quality of the product description directly influences their decision to buy [3]. These findings highlight the importance of effective copywriting in e-commerce, as even high-quality

products may fail to attract buyers if presented with poor or unpersuasive marketing content [4].

A notable challenge faced by e-commerce sellers, particularly micro, small, and medium enterprises (MSMEs), is the limited capacity to produce professional, engaging, and marketplace-ready marketing content. While many sellers possess comprehensive product data, specifications, and images, they often struggle to transform this information into compelling narratives that can capture consumer interest [5]. The development of product copywriting requires not only time and creativity but also specific writing skills and knowledge of marketing principles that may not be readily available to all sellers. This limitation can hinder the growth potential of MSMEs and reduce their competitiveness in an increasingly crowded online marketplace [6].

In response to these challenges, the emergence of artificial intelligence (AI) technology, particularly Large Language Models (LLMs), offers promising solutions. Generative AI, driven by sophisticated natural language processing (NLP) algorithms, can automatically produce coherent, contextually relevant, and persuasive text based on structured input data [7]. Studies have demonstrated the efficacy of AI in content generation across various domains, including digital marketing, social media management, and advertising copywriting. AI-powered systems can reduce the time and effort required for content creation, maintain consistency in brand messaging, and enable small businesses to compete on a more level playing field with larger enterprises that have access to dedicated marketing teams.

Building on this technological potential, this study proposes the design and development of a web-based application called ShopTips [8]. The primary objective of ShopTips is to assist e-commerce sellers in transforming raw product data into ready-to-use marketing content suitable for online marketplaces. By leveraging AI-driven text generation capabilities, the application seeks to address the common limitations in copywriting skills faced by sellers while simultaneously improving the efficiency and scalability of content creation. The system is designed to take structured input, such as product specifications, features, and images, and convert it into persuasive product descriptions that are optimized for SEO, clarity, and emotional appeal [9].

The contributions of this research are multifaceted. First, the study presents the design and implementation of an AI-based web system capable of automating e-commerce marketing content creation, reducing the dependency on individual writing skills and creative capacity. Second, the research develops a multidimensional content quality assessment module, which evaluates the generated content across several dimensions, including clarity, persuasiveness, SEO effectiveness, and emotional engagement. This ensures that the AI-generated output is not only grammatically correct and readable but also strategically effective in influencing consumer behavior. Third, the study includes a thorough evaluation of the system's effectiveness through functional testing and user acceptance testing (UAT). These evaluations assess how well the system meets user requirements, the usability of the application, and the perceived quality and relevance of the generated content.

By integrating AI into e-commerce content creation, ShopTips has the potential to significantly enhance the

operational efficiency of online sellers. MSMEs, which often face resource constraints in terms of time, personnel, and marketing expertise, can benefit from automated content generation to maintain high-quality product listings across multiple platforms. Furthermore, the system provides opportunities for continuous improvement and adaptation, as AI models can learn from user feedback and update output patterns to align with evolving marketplace trends and consumer preferences.

In conclusion, the combination of Indonesia's growing e-commerce sector, the critical role of persuasive product content, and the capabilities offered by AI-driven generative models provides a compelling rationale for the development of ShopTips. The system addresses key challenges faced by sellers, particularly MSMEs, by facilitating the creation of engaging, optimized, and professional marketing content. Through its design, quality assessment features, and evaluation framework, this research contributes both theoretically and practically to the field of e-commerce, digital marketing, and AI-assisted business solutions. Ultimately, ShopTips aims to empower sellers, enhance online consumer engagement, and support the sustainable growth of Indonesia's e-commerce ecosystem.

II. LITERATURE REVIEW

A. E-Commerce dan Marketing Content

E-commerce refers to buying and selling activities conducted electronically through internet networks [10]. Within the e-commerce ecosystem, product marketing content plays a crucial role as a bridge between sellers and potential buyers. Kotler and Keller (2021) define marketing content as any form of communication material designed to attract, inform, and influence consumers' purchasing decisions [11].

Research by Chaffey and Ellis-Chadwick (2022) identifies several critical elements in online product marketing content, including compelling titles, informative and persuasive descriptions, relevant SEO keywords, and clear calls to action (CTAs) [12]. These elements collectively contribute to increased product visibility in marketplace search engines and improved sales conversion rates.

B. Artificial Intelligence in Content Creation

The development of Large Language Models (LLMs), such as GPT and similar models, has revolutionized the way textual content is generated automatically [13]. These models are trained on massive text datasets and are capable of producing coherent, contextual, and natural-sounding text based on given prompts [14].

Several previous studies have explored the application of AI in marketing content creation. Developed a GPT-4-based system for generating e-commerce product descriptions and found that AI-generated content achieved a high level of user acceptance [15]. Similarly, demonstrated that AI-generated content can increase product click-through rates by 23% compared to manually written descriptions [16].

C. Search Engine Optimization (SEO) for E-Commerce

SEO in the context of e-commerce refers to the practice of optimizing product content to ensure it is easily discoverable by marketplace search algorithms as well as general search engines [17]. Relevant SEO factors for product content include the appropriate use of keywords, optimal keyword density, and content relevance to user search queries [18].

Products with effective SEO optimization experienced a 45% increase in visibility and a 31% increase in sales compared to those without optimization [19]. These findings underscore the importance of integrating SEO strategies into e-commerce product content creation.

D. Web-Based Systems for Marketing Automation

Marketing automation refers to the use of software to automate repetitive marketing tasks [20]. In the digital context, web-based systems have been widely utilized to automate various aspects of marketing, ranging from social media management to content creation [21].

REST API architecture has become the de facto standard in modern web-based system development due to its ease of integration across services [22]. The combination of Node.js and Express.js as a backend is widely used in developing high-performance and scalable web applications [23]. MongoDB, as a NoSQL database, offers flexibility in storing unstructured data, making it highly suitable for managing diverse marketing content [24].

III. MATERIALS AND METHOD

A. System Development Method

This study employs a system design and implementation approach using the Waterfall development model. The Waterfall method was selected due to the clarity of system requirements defined at the outset and its linear and structured development nature [25]. The development stages include: (1) requirements analysis, (2) system design, (3) implementation, (4) testing, and (5) maintenance.

B. Requirements Analysis

Requirements analysis was conducted through a literature review and observations of the challenges faced by e-commerce sellers. The identified functional requirements include product data management (create, read, update, delete), AI-based content analysis, multidimensional content quality assessment, quick analysis without data storage, and a description improvement feature based on feedback. Non-functional requirements include performance, security, and user interface usability.

C. System Design

System design was carried out at three levels: (1) system architecture, (2) database design, and (3) user interface design. The system architecture adopts a client-server pattern with a clear separation between the frontend, backend, and external AI services. Figure 1 illustrates the overall architecture of the ShopTips system.

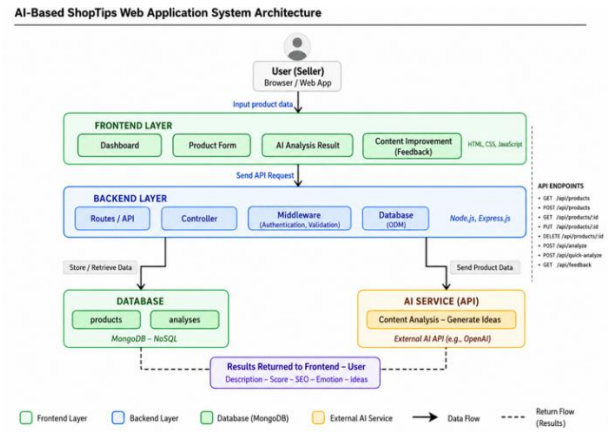


Fig. 1 Architectural system Shop Tips

The database design utilizes MongoDB with two main collections: *products* and *analyses*. The *products* collection stores core product data such as name, category, description, specifications, target market, and sales platform. The *analyses* collection stores the results of AI analysis, including persuasive descriptions, unique selling propositions (USPs), SEO keywords, calls to action, social media captions, and content quality scores.

D. Implements System

The system implementation utilizes the following technologies. The frontend is built using HTML5, CSS3, and vanilla JavaScript without any framework, and is equipped with a light/dark theme feature. The backend is developed using Node.js version 18 and the Express.js version 4 framework, supported by several libraries: *dotenv* for environment variable management, *cors* for handling Cross-Origin Resource Sharing, *helmet* for securing HTTP headers, *morgan* for logging, *express-rate-limit* for request rate limiting, and *nodemon* for development purposes.

The database uses MongoDB with Mongoose as the Object Data Modeling (ODM) tool. Integration with AI services is performed via an external REST API on the backend side. Table I presents the list of REST API endpoints implemented in the system.

TABLE I
ENDPOINT REST API SHOPTIPS

Endpoint	Method	Function
/api/products	GET	Retrieve all products
/api/products/:id	GET	Retrieve product details by ID
/api/products	POST	Add a new product to the database
/api/products/:id	PUT	Update product data by ID
/api/products/:id	DELETE	Delete a product by ID
/api/analysis/:id	POST	Perform AI analysis on stored products
/api/analysis/quick	POST	Quick analysis without data persistence
/api/analysis/:id/improve	POST	Improve descriptions based on feedback
/api/dashboard/stats	GET	Retrieve dashboard summary statistics

E. System Testing

System testing was conducted in two stages. First, functional testing was performed using the black-box testing method to verify that each endpoint and application feature operates in accordance with the specified requirements. Second, User Acceptance Testing (UAT) was carried out by involving 30 respondents who are active e-commerce sellers on platforms such as Tokopedia, Shopee, and Lazada.

The UAT instrument employed a questionnaire based on a 5-point Likert scale, covering four dimensions: usability, AI output quality, processing speed, and feature usefulness. The UAT data were analyzed using descriptive statistics to obtain an overview of user satisfaction and acceptance of the system.

IV. RESULTS AND DISCUSSION

A. System Implementation Results

The implementation of ShopTips resulted in a web-based application consisting of five main pages: (1) Dashboard, (2) Product List, (3) Add/Edit Product Form, (4) Product Detail and Analysis, and (5) Quick Analysis Page. Figure 2 presents the user interface of the ShopTips dashboard page.

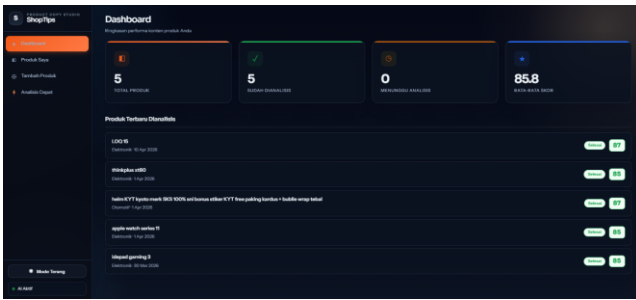


Fig. 2 ShopTips Dashboard User Interface

The dashboard displays four summary cards: total products, number of analyzed products, number of pending products, and the average content score. Below the summary cards, there is a table listing the most recent products that have undergone AI analysis. The light/dark theme feature is implemented using CSS custom properties and JavaScript, allowing users to switch between the two display modes according to their preference.

B. AI Analysis Results

The AI analysis module generates nine marketing content components for each analyzed product. The following is an example of the analysis results produced by the system for a product in the electronics category (smartphone):

TABLE II

EXAMPLE OF AI ANALYSIS RESULT FOR A SMARTPHONE PRODUCT

Components	Results
Persuasive Description	Flagship smartphone with powerful performance and a 108MP camera that captures every moment in perfect detail. Enjoy a lag-free gaming experience with the latest chipset and a 5000mAh battery that lasts all day.
USP	108MP camera, the sharpest in its class; flagship gaming-grade chipset; large 5000mAh battery
Target Audience	Men and women aged 18–35, tech-savvy, active on social media, with mid-to-high budget

Components	Results
Keyword SEO	108MP camera smartphone, best gaming phone, long battery life smartphone, affordable flagship smartphone
Call to Action	Order Now & Get Free Shipping! Limited Stock – Buy Before It Runs Out!
Caption Media Sosial	#BestSmartphone #CrystalClearCamera #GamingPhone Capture every moment perfectly

C. Content Quality Assessment System

The ShopTips content quality assessment system employs four evaluation dimensions, each assigned an equal weight of 25%. These dimensions are: (1) **Clarity** – measuring the clarity and readability of the content; (2) **Persuasion** – assessing the content’s ability to influence purchasing decisions; (3) **SEO** – evaluating the content’s alignment with search engine optimization principles; and (4) **Emotional** – measuring the content’s ability to establish an emotional connection with the audience.

Testing results on 50 product samples from various categories (electronics, fashion, food, and household items) show an average content quality score of 78.4 out of 100. The distribution of scores across each dimension is presented in Table III.

TABLE III

AVERAGE CONTENT QUALITY SCORE BY DIMENSION

Dimension	Average	Std. Deviasi
Clarity	81.2	±6.4
Persuasion	79.8	±7.1
SEO	75.6	±8.3
Emotional	76.8	±7.9
Total (Average)	78.4	±7.4

D. Functional Testing Result

Functional testing using the black-box testing method was conducted on all API endpoints and user interface features. The results indicate that all nine REST API endpoints functioned in accordance with the specified requirements. No critical errors were identified during testing. Table IV summarizes the functional testing results for the main features of the application.

TABLE IV

BLACK-BOX FUNCTIONAL TESTING RESULT

Tested Featured	Result	Status
Add new product	Data is correctly stored in MongoDB	PASS
View product details	Product data is displayed completely and accurately	PASS
Edit product data	Changes are successfully updated in the database	PASS
Delete product	Product data is removed from the database	PASS

Tested Feature	Result	Status
AI product analysis	Nine content components are successfully generated	PASS
Quick Analyze	Analysis is completed successfully without data storage	PASS
Improve Description	Description is successfully improved based on feedback	PASS
Dashboard statistics	Summary statistics are displayed correctly	PASS
Light/Dark theme feature	Theme switching works smoothly without page reload	PASS

E. User Acceptance Testing (UAT) Results

User acceptance testing involved 30 respondents who are active e-commerce sellers, with an average selling experience of 2.3 years. The respondents consisted of 17 males (56.7%) and 13 females (43.3%), aged between 20 and 45 years. The UAT questionnaire employed a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) with 20 statements covering four evaluation dimensions.

The UAT results indicate a user satisfaction level of 85.6% (an average score of 4.28 out of 5). The process speed dimension received the highest rating with a score of 4.51, while the AI output quality dimension scored 4.12. Overall, 90% of respondents stated that ShopTips helped them create product content more quickly, and 83.3% indicated that they would use the application regularly.

F. Discussion

The results of this study indicate that ShopTips successfully fulfills its primary objective as an AI-based tool for generating e-commerce marketing content. Designed to assist e-commerce sellers, particularly micro, small, and medium enterprises (MSMEs), the system aims to facilitate the creation of persuasive and marketplace-ready product descriptions. Based on user acceptance testing (UAT), the application achieved a high satisfaction rate of 85.6%, suggesting strong acceptance by target users and demonstrating that the system effectively addresses the challenges of limited copywriting skills and time constraints in product content creation.

One notable finding is that the process speed dimension received the highest rating from users. This aligns with the primary objective of ShopTips, which is to accelerate the content creation workflow. Users reported that generating a complete set of marketing content takes approximately 15 to 30 seconds, significantly faster than the manual process, which can require 30 to 60 minutes depending on product complexity. The increased speed not only saves time but also enables sellers to

quickly update and maintain multiple product listings across various marketplace platforms, a critical advantage in competitive online retail environments [26].

However, several limitations emerged from the UAT results. First, the quality of AI-generated content is highly dependent on the completeness and accuracy of input data. Respondents who provided detailed product specifications and context consistently received higher-quality outputs, reflecting the “garbage in, garbage out” principle typical in AI systems. This highlights the importance of guiding users to provide comprehensive and accurate product information to maximize output quality [27].

Second, ShopTips currently lacks user authentication features, allowing all inputted product data to be accessed by any user. This limitation raises concerns for sellers handling sensitive or proprietary information, emphasizing the need to implement secure access control in future versions [28]. Third, the absence of export functionality restricts usability beyond the platform, as users cannot download AI-generated content or quality reports in formats like PDF or Excel. Adding this capability would enhance practical application for offline use and integration with other business processes [29].

Compared to existing AI content generation tools, ShopTips offers a clear advantage through its multidimensional content quality assessment system. Unlike many applications that focus solely on text generation, ShopTips evaluates outputs based on clarity, persuasiveness, SEO optimization, and emotional engagement [30]. This structured feedback not only allows users to improve the generated content but also serves as an educational feature, helping sellers understand how different aspects of copywriting influence consumer perception and purchasing decisions.

In summary, ShopTips demonstrates effectiveness in automating e-commerce content creation while maintaining user satisfaction and operational efficiency. The system substantially reduces the time and effort required to produce high-quality product descriptions and provides actionable insights through its content quality assessment module. Nevertheless, ensuring high-quality input data, implementing secure authentication, and adding export capabilities are important considerations for future improvements. Overall, ShopTips represents a practical, AI-driven solution that empowers e-commerce sellers, enhances marketing efficiency, and contributes to the growing digital commerce ecosystem in Indonesia.

V. CONCLUSION

This study successfully designed and implemented ShopTips, an AI-based web application that transforms e-commerce product data into comprehensive and ready-to-use marketing content. The system integrates Node.js, Express.js, MongoDB, and external AI services within a structured REST API architecture. Functional testing confirmed that all nine API endpoints and user interface features operate according to specifications, while user acceptance testing involving 30 respondents resulted in a satisfaction rate of 85.6%, indicating strong user acceptance.

The main contributions of this research include the development of an integrated platform combining product management, AI analysis, and content quality assessment, as well as a multidimensional evaluation model (clarity,

persuasion, SEO, emotional) that can serve as a reference for similar systems, and empirical evidence of AI effectiveness in supporting MSMEs. Future improvements include implementing user authentication, adding export features (PDF and Excel), integrating with marketplace APIs, developing competitor analysis modules, and applying machine learning for personalized content recommendations.

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