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Exploring the Adoption of Free Artificial Intelligence in E-Commerce Platforms: An Organizational and Customer-Centric Driver Strategically Shaping the Clothing Industry

JOANA MARIE G. BERNARDO
Polytechnic University of the Philippines
Sta. Mesa, Manila, Philippines

Corresponding author: joanabernardo94@gmail.com

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ABSTRACT

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The rapid integration of freemium AI tools is shaping how clothing industries streamline their operations and engage with customers online. In emerging markets like the Philippines, SMEs face several challenges due to limited resources, consumer demands, and the fast pace of digitalization. This study investigates the effects of freemium AI on organizational efficiency and customer engagement strategies among all clothing e-commerce industries within Bulacan, with the use of Dynamic Capabilities Theory, it examines how enterprises sense opportunities, utilize digital resources, and transform processes. A qualitative research design was employed, utilizing in-

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depth interviews with 15 registered clothing business owners with at least three years of operational history. Findings reveal that free AI tools improve centralized management, targeted advertising, content creation, and communication, which significantly enhance both operational efficiency and customer satisfaction. Despite challenges, the study highlights that free AI tools serve as scalable, accessible, and democratizing resources for digital transformation. The study concludes that strategic adoption of free AI tools not only strengthens business performance but also promotes inclusive and sustainable growth in the global clothing e-commerce.

INTRODUCTION

The interconnectedness of free artificial intelligence (AI) tools in e-commerce has significantly altered how businesses interact with customers and streamline operations. Software like Meta Business Suite enhances operational efficiency through centralized content management, scheduling, marketing, analytics, and cross-platform integration (Khan et al., 2025; Gurjar et al., 2024). Globally, AI-driven predictive analytics enable accurate demand forecasting and inventory control in North American and European clothing retailers (Grant, 2024), while across the Asia-Pacific, AI personalization improves consumer loyalty, making free AI tools are essential factor for staying competitive (Banerjee, 2019).

Southeast Asia is digitally transforming, with SME adoption of AI rising. Indonesia and Vietnam top at 42%, Singapore and Thailand at 39%, and the Philippines and Malaysia with 19% and 15%, respectively (PR Newswire, 2025). Despite awareness of its functions, many still struggle to adopt AI in business. Governments across ASEAN (Singapore, Malaysia, Thailand, Vietnam, Indonesia, Philippines) have adopted a policy in AI utilization to promote infrastructure and innovation across the country (Zaber & Rohman, 2025). In Malaysia, the AI Roadmap (AI-RMAP 2021–2025) and the MYDigital initiative support SME digitalization; however, adoption remains limited, caused by various barriers like insufficient human skills and financial resources (Ahmed, 2024). Moreover, 56% of ASEAN MSMEs use only basic default tools (e.g., Word, email), with only 10% integrating advanced optimized systems such as automation and analytics (Asia, 2018). Although 68% of businesses recognize the importance of AI, only 47% have implemented it—indicating a significant opportunity gap (Market Research Southeast Asia, 2025).

In the Philippines, Central Luzon is home to 155,708 MSMEs—accounting for nearly all regional businesses, employing over 726,000 people (DTI, 2023). Moreover, the Philippine e-commerce market is projected to increase from USD

17.65 billion in 2025 to USD 33.65 billion by 2030, at a CAGR of 13.78%. With 86.98 million Filipinos (73.6%) online in early 2024—predominantly via mobile devices—conditions are ripe for digital innovation. Yet, most studies on AI adoption focus on larger firms, with limited insight into Bulacan's MSMEs, which rely on freemium AI tools like chatbots, analytic tools, or content generators to remain competitive.

Despite global and regional recognition of AI's transformative role in e-commerce, significant gaps remain: (1) Research predominantly emphasizes large firms or paid AI solutions, overshadowing the free AI tools accessible to resource-constrained SMEs. (2) ASEAN studies tend to generalize across e-commerce sectors, even though the clothing industry—relying on trend responsiveness and personalization—presents unique dynamics. (3) Empirical analysis focusing on Bulacan clothing SMEs' strategic use of free AI tools remains absent.

This study addresses these gaps by empirically examining how clothing SMEs in Bulacan leverage free AI tools to streamline operations and customer engagement. Unlike prior work, it spotlights accessible, no-cost AI technologies as practical catalysts for digital transformation.

The rationale is compelling: investigating Bulacan—a hub of clothing SME activity—through the lens of free AI adoption can reveal actionable insights for inclusive digital growth. The research is also driven by the author's dual expertise in digital marketing and business analytics. Furthermore, it aligns with the United Nations Sustainable Development Goals: SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 12 (Responsible Consumption and Production)—highlighting how free AI can drive cost-efficient, sustainable business practices.

FRAMEWORK

This study is anchored on the Dynamic Capabilities Theory (DCT) proposed by Teece, Pisano, and Shuen (1997), which explains how organizations reconfigure resources and competencies to sustain competitiveness in rapidly changing environments. DCT provides the analytical lens to examine how the MSMEs clothing sector adopt free artificial intelligence (AI) tools to enhance e-commerce operations.

The study primarily focuses on three variables: (1) Adoption of Free AI Tools – refers to the extent by which clothing businesses utilize cost-free AI applications such as chatbots, recommendation systems, analytics dashboards, and content creation platforms (Dwivedi et al., 2021). This variable captures the technological

uptake by SMEs constrained by financial and technical resources (Trenkle, 2020). (2) Dynamic Capabilities – Conceptualized as the organizational competencies enabling firms to adapt to technological disruptions, dynamic capabilities in this study are expressed through: (a) Sensing Capabilities, or the ability to detect and interpret opportunities and challenges in the digital marketplace (Teece, 2007). (b) Seizing Capabilities, or the capacity to allocate and mobilize resources for AI adoption (Pitelis & Teece, 2010). (c) Transforming Capabilities, or the restructuring of workflows, routines, and business models to integrate AI technologies effectively (Teece et al., 2016). (3) Business Performance Outcomes. This variable refers to the tangible and intangible improvements achieved by clothing SMEs through AI adoption, including enhanced operational efficiency, improved decision-making, expanded market reach, and long-term competitiveness in the e-commerce environment (Marzban, 2024; Mariani & Borghi, 2021).

The framework proposes that the adoption of free AI tools, mediated through dynamic capabilities which leads to improvements in business performance. Furthermore, the process is cyclical rather than linear: feedback from AI implementation continuously informs ongoing sensing and seizing, creating an adaptive loop of technological integration (Teece, 2007).

By integrating theoretical insights from DCT with the realities of SME operations in the digital marketplace, the framework highlights the strategic role of free AI in enabling clothing businesses to overcome resource limitations, enhance innovation, and achieve sustainable growth (Trenkle, 2020; Dwivedi et al., 2021).

OBJECTIVES OF THE STUDY

This study aims to examine the adoption of free Artificial Intelligence (AI) tools among micro, small, and medium-sized clothing enterprises operating in the e-commerce sector, guided by the principles of the Dynamic Capabilities Theory. Specifically, the study (1) determines how clothing businesses demonstrate sensing capabilities by identifying opportunities and challenges in adopting free AI tools; (2) evaluates how these businesses exercise seizing capabilities through the mobilization of resources, including human, financial, and technological assets, to integrate AI into their operations; and (3) analyzes the extent to which transforming capabilities enable businesses to restructure processes, improve efficiency, and sustain competitiveness through AI-enabled solutions. Furthermore, the study (4) investigates the relationship between AI adoption and key business performance outcomes such as operational efficiency, market

reach, and customer engagement; and (5) explores the challenges and constraints faced by clothing enterprises in adopting free AI, particularly in resource-limited contexts, to provide actionable insights for sustainable digital transformation.

In alignment with the United Nations Sustainable Development Goals (SDGs), this study also (6) contributes to SDG 8 (Decent Work and Economic Growth) by highlighting how free AI tools can support inclusive growth for small enterprises; (7) supports SDG 9 (Industry, Innovation, and Infrastructure) by emphasizing AI-driven innovations that strengthen the digital infrastructure of clothing businesses; and (8) advances SDG 12 (Responsible Consumption and Production) by promoting efficient, scalable, and resource-conscious digital solutions. By framing the objectives within this global agenda, the study underscores the broader societal, economic, and sustainability impacts of AI adoption in the clothing e-commerce industry.

METHODOLOGY

Research Design

The study employed a qualitative research design with a hermeneutic phenomenological orientation, appropriate for exploring the lived experiences of clothing business owners adopting free Artificial Intelligence (AI) tools in e-commerce. Phenomenology emphasizes uncovering meaning from participants' subjective consciousness, while hermeneutics extends this by interpreting the socio-material context shaping their narratives (van Manen, 2016). This methodology is particularly relevant for capturing the nuances of entrepreneurial sense-making, capability development, and adaptive practices in resource-constrained settings. Semi-structured interviews and artefact walkthroughs were used as the primary means of data generation (Creswell & Poth, 2018). The research was conducted in the Province of Bulacan, Philippines, a key hub for micro, small, and medium-sized enterprises (MSMEs) engaged in both traditional and digital commerce. The province has witnessed a surge in clothing enterprises expanding into online platforms such as TikTok Shop, Shopee, and Instagram, making it an appropriate site for investigating AI-driven digital transformation. A total of 15 legally registered clothing business owners operating within Bulacan participated and were selected through purposive sampling, ensuring that only entrepreneurs with at least three years of business operations, valid business permits, and active utilization of free AI tools for e-commerce functions (e.g., marketing, analytics, chatbots) were included. The sample represented micro, small, and medium enterprises, with participants ranging from ages 24 to 45 and educational backgrounds primarily in business,

marketing, IT, or entrepreneurship. The sample size was deemed sufficient based on data saturation, whereby new interviews no longer yielded novel insights.

Instrumentation

A semi-structured interview guide served as the primary research instrument, allowing consistency while enabling flexibility to probe unique experiences (Kallio et al., 2016). The guide was structured into four thematic clusters: enterprise background, dynamic capabilities (sensing, seizing, transforming), business performance outcomes, and barriers and enablers. Draft questions were aligned with Dynamic Capabilities Theory (Teece, 2023) and entrepreneurship research. A pilot test with two non-sample entrepreneurs facilitated refinement of question sequencing and clarity, and expert validation from three scholars in entrepreneurship and digital innovation enhanced construct alignment and language. All interviews followed standardized protocols, were audio-recorded with consent, and transcribed verbatim to ensure reliability and auditability (Creswell, 2012).

Research Ethics Protocol

The study adhered to the National Research Council of the Philippines' Code of Ethics and received clearance from the Polytechnic University of the Philippines Ethics Review Board. Participants provided written and verbal informed consent, were assured of confidentiality through pseudonyms and removal of identifiable details, and were informed of their right to withdraw at any stage without consequence. The researcher maintained a reflexive journal to minimize bias and ensure fair interpretation (Kvale & Brinkmann, 2009). Data collection occurred from April to June 2025, with each participant engaging in a 60–90-minute semi-structured interview conducted via Zoom. Participants also shared AI dashboards or workflow artefacts through screen-sharing to enrich contextual understanding, while field notes documented non-verbal cues and reflexive insights. Audio files were transcribed verbatim and accuracy-checked, and member checking was performed by sharing thematic summaries with participants for validation.

Data Collection

Thematic analysis was used using NVivo 14 software to manage and interpret data. Following Van Manen's (2016) hermeneutic cycle, transcripts were iteratively coded to capture the meanings participants ascribed to AI adoption. Bracketing and reflexive memoing were used to mitigate researcher bias. Themes were clustered around the three dynamic capabilities—sensing, seizing, and

transforming—while additional categories such as barriers and enablers emerged inductively. This analytic strategy enabled the synthesis of individual narratives into a coherent understanding of AI adoption practices among clothing business owners.

RESULTS AND DISCUSSION

This section presents the findings of the study based on the experiences of clothing micro, small, and medium-sized enterprises (MSMEs) in Bulacan in utilizing free artificial intelligence (AI) tools to enhance their e-commerce operations. The results are organized according to the themes derived from participants' responses and are discussed in relation to existing literature, thereby validating the theoretical foundations of the study.

Product Research and Trend Forecasting. Participants emphasized the significant role of free AI tools in enabling efficient product research and forecasting market trends. Tools such as ChatGPT and Google Trends were applied to analyze search volumes, customer sentiments, and emerging styles, assisting entrepreneurs in anticipating demand shifts.

Others associate vigilance with survival. As Participant 7 stated:

"I would say it is extremely important. E-commerce moves quickly, and if you are not constantly updating how you work, you risk falling behind. Opportunities do not stay open forever. For us, AI is one of those things that can unlock a lot of potential if used wisely. We treat it like a toolbox. Every few months, something new comes along, and if we wait too long to test it, we lose competitive advantage. So yes, identifying these opportunities regularly is part of our strategy. We see it as a form of business agility."

This aligns with the findings of Cui et al. (2018), who highlighted that AI-based forecasting reduces uncertainty by leveraging consumer-generated data to detect market signals and demonstrate that AI algorithms are highly effective at analyzing large datasets to segment customers and predict preferences, thereby enabling tailored marketing strategies. This level of personalization has led to increased customer engagement and sales performance, particularly in Southeast Asian markets (Putra, 2025). Similarly, Alzaghal et al. (2024) and Shi et al. (2021) argue that AI-powered analytics can forecast fashion demand more accurately than traditional methods, improving inventory control and trend responsiveness. The testimonies revealed that entrepreneurs now rely on AI to quickly validate product ideas and avoid overproduction, strengthening their capacity to respond to dynamic market conditions.

Competitor Analysis. Participants noted that AI-driven scraping tools and

free plug-ins such as SimilarWeb or SEMrush free versions, provided actionable insights into competitor pricing, promotions, and keyword performance. These tools allowed MSMEs to adjust marketing strategies and identify competitive gaps more efficiently.

Participant 9 emphasized how free AI influenced their decision-making when it comes to content creation to be ahead of the competitors:

"It's extremely important. We treat AI like any other core tool. For us, identifying new opportunities with AI is part of staying competitive. Customers are getting used to personalization, fast replies, and engaging content. If we cannot meet those expectations quickly, we risk being forgotten. AI offers a way to bridge that gap without expanding our staff every time."

This reflects a structured effort to stay informed and agile amidst the increasing competition in the clothing industry. Alazaghal et al. (2024), who emphasizes that competitive intelligence derived from AI tools equips businesses to make data-driven decisions in rapidly shifting digital environments. Furthermore, Felix and Gabriel (2024) affirm that AI-enhanced competitor analysis increases strategic agility, enabling SMEs to adapt pricing and promotional tactics promptly. The accounts of entrepreneurs validate the potential of AI in democratizing access to competitive data, which was previously reserved for larger firms with extensive resources.

Visual Merchandising and Design. Participants discussed the use of Canva AI and Fotor for generating engaging promotional visuals, logo concepts, and seasonal advertising materials. These tools provided professional-quality designs at no cost, eliminating the need for dedicated graphic designers. According to Hassan (2021), visual appeal plays a pivotal role in digital commerce, influencing click-through and conversion rates. The use of AI in creative production supports Kim and Seo (2023), who argue that automation democratizes design, enabling SMEs to compete with larger brands in terms of branding consistency.

Participant 11 shared the integration of AI in content generation and designs for some marketing aspects.

"We always edit them. Sometimes the tone is too stiff or doesn't match our audience. But the ideas, structure, and even the timing suggestions are useful. We think of the AI as a junior intern; it gives us a solid draft, but the final output still has a human touch."

This evidence demonstrates that free AI design tools have enhanced MSMEs' digital storefronts, strengthening brand identity without adding financial strain. This allows participants to maintain a good online presence.

Content Creation and Copywriting. Participants highlighted that ChatGPT and Quillbot were frequently used to generate engaging product

descriptions, captions, and ad copy tailored to different platforms. This reduced the time spent brainstorming and improved marketing consistency.

Participant 7 shared how ChatGPT aids interpretation:

"ChatGPT is definitely one of our main ones. It is reliable and flexible. But we also use Canva's Magic Write for quick content generation, especially when we are doing promotional posts."

This finding aligns with Dwivedi et al. (2021), who argue that AI tools in marketing communication enhance productivity and facilitate language adaptation to target audiences. Similarly, Giuggioli, G., and Pellegrini (2023) emphasize that AI-generated content fosters customer engagement when optimized with contextual relevance. Entrepreneurs' testimonies confirm that AI has become an essential partner in ensuring consistent, persuasive, and professional marketing communication.

Social Media Marketing. Participants revealed that they leveraged tools like Canva and Meta Business Suite's AI-based scheduling and TikTok's auto-captioning features to automate posting, analyze audience engagement, and boost organic reach.

Participant 7 emphasized the scheduling advantage of using TikTok and Meta Business Suite:

"It made things much easier. We used to brainstorm everything manually, which drained our creativity. Now, we ask AI to generate hooks or caption starters. Even if we do not use them as-is, they give us direction. We also use AI to analyze which posting times get better engagement. Based on that, we adjust our content calendar. We still schedule manually through Meta or TikTok, but AI helps with deciding what and when to post."

This echoes the argument of Appel et al. (2020), who highlight social media AI's role in enhancing brand visibility and consumer interaction. The results also align with Shoeb and Zillul (2025), who underscore how AI-powered campaign optimization increases responsiveness to user behavior. For MSMEs with limited manpower, the integration of these tools streamlined promotional activities, reinforced brand consistency, and reduced the cognitive load of daily marketing management.

Customer Engagement and Personalization. Participants shared how they used free AI chat features embedded in platforms like Facebook Messenger and Instagram to personalize responses and tailor recommendations. Meta Business Suite integrates inbox management by consolidating messages from Facebook Messenger and Instagram into one interface, significantly reducing response delays (Bundy et al., 2024; Sun et al., 2022).

Participant 12 added how AI helped businesses in personalizing responses to

different inquiries,

"We now use a chatbot to handle routine inquiries, such as size guides, delivery times, payment methods, and return policies. This takes care of about 70 percent of our messages. It responds instantly, even during off-hours. For more complex concerns, the chatbot hands off the conversation to our human staff. The split is efficient, and it lets our team focus on high-touch issues."

This corresponds with Vashishth et al. (2024), who emphasize that personalization via AI fosters customer loyalty and enhances purchase likelihood. AI-enabled customization strengthens brand-consumer relationships by creating perceived intimacy. The findings suggest that even without premium systems, entrepreneurs can deliver personalized experiences that meet evolving consumer expectations, demonstrating the accessibility of personalization strategies through free AI tools.

Pricing and Discount Optimization. Several participants employed AI-based calculators and Google Sheets AI plug-ins to model pricing, test discount combinations, and evaluate consumer response.

Participant 8 highlighted the importance of AI in adjusting prices based on the analytics that it provided:

"We take our TikTok Shop and Shopee data, feed it into a basic AI spreadsheet tool, and it highlights which products are falling behind and which ones are getting more views but fewer checkouts. We then adjust prices or bundles based on that."

These practices are supported by Luo et al. (2019), who argue that AI enables dynamic pricing models that maximize revenue while adapting to consumer behavior. Additionally, Sestino et al. (2020) highlight that AI improves SMEs' ability to strategically balance affordability and profitability. Entrepreneurs confirmed that AI-assisted pricing reduced guesswork and enhanced competitiveness in saturated digital marketplaces.

Inventory Management. Participants utilized free systems such as Square AI inventory tracking and Shopify Lite integrations to monitor stock, avoid overstocking, and anticipate replenishment needs. This finding validates the claims of Hazen et al. (2014), who highlight the critical role of AI in optimizing supply chain operations. More recent work by Helo et al. (2022) also shows that AI enhances resilience in inventory management, particularly during fluctuating consumer demand. The testimonies underscore how MSMEs have been able to minimize waste, optimize storage costs, and maintain the availability of fast-moving items despite resource limitations.

Participant 7 emphasizes how AI helps in managing stocks,

"Even our inventory restocking decisions are now assisted by AI reports. These changes saved time and let our staff focus on more strategic tasks."

Participant 8 also added:

"Before, we used separate apps for customer service, posting content, and tracking inventory. Now, with a few AI-enhanced platforms, we can monitor most of that in one or two dashboards."

Additionally, Participant 9 highlighted that:

"It helps with summarization and forecasting. We use AI to summarize sales trends weekly. It flags underperforming items, shows bounce rates, and predicts when we'll run out of stock based on current demand."

Chatbots and Autoresponders. Participants described how AI-powered chatbots such as ChatGPT and free auto responder systems automated replies to customer inquiries and generated sales insights. For instance, Participant 15 highlighted chatbots' ability to respond to customers,

"We have a bot that handles common questions, like delivery time, stock availability, and sizing. It covers maybe 60 to 70 percent of our messages. More complex cases are still handled by a person. The bot gives suggested replies, and the staff just reviews and sends them."

Additionally, Participant 6 stated that,

"That's where we saw the biggest change. We use an AI-integrated chatbot that handles about 70% of common queries, size guide, shipping ETA, and return policies. Our reps now focus on escalated cases or custom orders. It's made support faster and more consistent."

This echoes the claims of Heo and Lee (2018) that chatbots serve as strategic communication tools, enhancing customer support and operational efficiency. Chatbots enhance business agility by facilitating quick decision-making and increasing responsiveness in changing markets (Asiedu et al., 2024). Azmi et al. (2023) investigate how these improvements enable organizations to gain more profound understanding from customer engagements. By understanding intent, behavioral trends, and user context, chatbots incorporated into business intelligence systems now aid in predictive analytics and strategic choices. DeZao (2024) emphasizes that transparent chatbots—explaining recommendation logic—enhance customer trust and cross-sell uptake. Such findings validate participants' reliance on free AI chatbots to provide 24/7 service without enlarging staff, and Miklosik et al. (2021) emphasize that chatbots accelerate digital business transformation, while Andrade and Tumelero (2022) highlight their evolving role in knowledge management and decision support. Patil (2024) further validates those autoresponders reduce response times by over 70%. The findings illustrate how free AI chatbots not only support customer communication but also strengthen managerial decision-making.

Omnichannel Syncing. Participants stressed the importance of

synchronization tools like CedCommerce, AfterShip, and Big Seller in ensuring consistent product listings, prices, and order management across Shopee, TikTok, Instagram, and Facebook.

Participant 9 emphasized the customer benefit:

"Only one tracking link, AfterShip will update all delivery and order information across platforms for customers."

Participant 7 added that:

"We use BigSeller to sync orders and stock between TikTok, Shopee, and our website. It is not purely AI-based, but we use AI to interpret the data coming in. For example, we use it to spot platform-specific buying trends. We also set rules that trigger actions across channels, like sending follow-up messages or reminders automatically."

This aligns with Joshi et al. (2023), who state that AI enhances omnichannel consistency through real-time processing. Similarly, Ng et al. (2021) emphasize that customers demand seamless interactions across platforms, making syncing essential for trust**.** Li and Wang (2023) also confirm that synchronization improves service speed and inventory visibility. AI plays a pivotal role in enabling real-time data synchronization, personalized recommendations, and unified customer profiles, thus fostering cohesive brand interactions (Shaw, 2025; Raji et al., 2024).

Meanwhile, Shaw (2025) identifies the primary challenges in AI implementation within e-commerce, including data silos and integration complexity, and recommends a phased approach where SMEs deploy AI middleware that bridges disparate systems. By employing AI-driven APIs and event-driven architectures, firms can ensure that inventory changes in the warehouse management system automatically propagate to the e-commerce platform, mobile app, and in-store kiosks. This tight data coupling reduces stockouts and oversells, improving customer satisfaction and operational efficiency (Shaw, 2022). The findings suggest that free AI syncing tools have transformed MSMEs into more agile and customer-centric enterprises.

Logistics and Delivery Optimization. Participants leveraged AI tools like AfterShip and Google Maps integration to optimize delivery scheduling and provide customers with real-time shipment updates.

Participant 15 emphasizes the use of AI not only in customer support but also in the fulfillment of various orders.

"We use a shared Notion board for campaign planning, and the AI features there help summarize notes and suggest reminders. It keeps everyone on the same page. Before, we had tasks spread across different chats and apps. Now it's easier to track updates, especially for the content and fulfillment team."

This supports the findings of Hofmann et al. (2019), who highlight AI's

role in improving last-mile delivery efficiency. Similarly, Kern (2021) notes that AI-powered logistics improve accuracy and timeliness in order fulfillment. Entrepreneurs confirmed that these systems reduced delivery errors, improved customer trust, and streamlined communication between buyers and sellers.

Customer Feedback and Sentiment Analysis. Participants utilized free AI plug-ins to analyze product reviews, Facebook comments, and ratings, helping them identify pain points and improve offerings. This corresponds with the study of Medhat et al. (2014), who argue that sentiment analysis aids SMEs in capturing customer perceptions effectively. Clavel et al. (2015) further highlight that AI-based feedback systems enhance decision-making by transforming unstructured text into actionable insights. Entrepreneurs affirmed that sentiment monitoring enabled them to proactively address complaints and refine marketing messages, thereby enhancing their brand reputation.

Participant 9 noted the importance of AI in analyzing customer feedback across e-commerce platforms,

"Manually reading through 500 reviews is not practical. AI helps us spot recurring issues, like sizing concerns or product packaging, and we take action faster. It's not perfect, but it saves us hours every month."

Financial Management. Entrepreneurs shared that free AI calculators and Google Sheets plug-ins supported cash flow tracking, expense classification, and forecasting.

Participant 5 observed:

"For sure. I don't outsource writing or poster layouts anymore. That used to cost us around ₱3,000 per month. Now we manage in-house with just free tools. Also, since we batch work faster, we save on overtime or late shipping."

These findings reinforce the claims of Creswell (2012). Caryannis et al. (2025), highlight AI's role in improving SMEs' financial resilience through predictive analytics. Furthermore, Yi et al. (2023) argue that AI adoption in accounting enhances transparency and reduces financial mismanagement risks. For participants, AI-driven financial tools offered a cost-free yet reliable mechanism for organizing and interpreting financial data, supporting more informed fiscal decisions.

Cybersecurity and Fraud Detection. Participants reported using AI-powered free plug-ins that flagged suspicious login attempts, fraudulent orders, or unusual payment behaviors.

Participant 13 shared its experience of experiencing security issues:

"Yes, we detected suspicious activity, especially with tools that analyze customer messages. We avoid uploading any customer-identifiable info. If we test a tool that stores inputs or outputs on external servers, we check the terms carefully. If they are

vague or too broad, we skip that tool."

This is consistent with the findings of Sarker et al. (2020), who emphasize that AI tools enhance SMEs' ability to detect cyber threats and prevent fraud. Similarly, Rawindaran et al. (2021) highlight AI's function in real-time anomaly detection, mitigating risks in digital commerce. MSMEs in Bulacan demonstrated that even without costly IT systems, free AI features embedded in platforms significantly strengthened digital security.

Training and Knowledge Sharing. Participants indicated that AI platforms such as YouTube AI-curated tutorials and ChatGPT-assisted training modules enabled them to quickly learn e-commerce practices and share knowledge with staff. Additionally, certain government institution supports the learning of business owners.

Participant 2 described the impact of government support:

"DTI Bulacan AI bootcamps, TESDA digital tools grants, lower the entry barrier."

Participant 6 added:

"DTI workshops, private incubators like QBO. Free trainings with digital toolkits."

Participant 13 appreciated the accessibility:

"DTI's free digital-skills webinar series, free and easy to follow, even without a technological background."

This resonates with Maier and Klotz (2022), who argue that AI enhances e-learning by personalizing training pathways. Likewise, Ifenthaler and Yau (2019) emphasize that AI fosters collaborative learning, which is particularly beneficial for SMEs with limited training budgets. Entrepreneurs testified that AI-based learning empowered them to continuously update skills, supporting adaptability in a fast-changing digital landscape.

Sustainability Practices. Participants revealed that AI tools assisted in monitoring fabric sourcing, identifying eco-friendly suppliers, reducing packaging waste, and maintaining a healthy working lifestyle. These findings confirm the claims of Nascimento et al. (2019), who emphasize AI's role in promoting circular economy practices in retail. Similarly, Garcia-Muiña et al. (2018) highlight how AI supports sustainable supply chain management through data-driven insights. Entrepreneurs recognized that adopting eco-friendly practices not only aligned with environmental advocacy but also improved brand competitiveness among conscious consumers and maintained efficiency in the workplace.

Participant 14 shared that:

"Some were worried about losing their tasks to automation. Others just didn't want to learn another app. We handled that by showing them how it helped, not

replaced, their work. We made it optional at first. The moment they saw it saved time or reduced stress, they started asking for more tools themselves."

The findings reinforce the Dynamic Capabilities Framework, showing that the free AI tools enhanced entrepreneurs' abilities to sense business opportunities and streamline operations. The integration of AI democratized access to advanced business intelligence, enabling even resource-constrained MSMEs to build resilience and adaptability in volatile digital markets. However, limitations such as restricted features, potential data privacy issues, and the need for human oversight to verify AI outputs. These limitations underscore the importance of continuous capacity building and critical evaluation of AI tools in ensuring the sustainability of digital entrepreneurship.

CONCLUSIONS

This study reveals how the Philippine micro and small clothing industries strategically leverage free AI tools to overcome resource constraints and compete effectively with larger, capital-intensive brands. These post-pandemic start-ups show lean teams of two to five members, capitalization under ₱3 million, and a strong focus on youth-oriented and niche markets, such as Gen Z and Millennials. Through the lens of Dynamic Capabilities Theory, findings indicate that entrepreneurs actively sense emerging AI tools, seize opportunities through low-risk pilot testing, and transform experimental applications into institutionalized business routines, embedding freemium AI into operational plans, OKRs, and SOPs. These mechanisms translate experimentation into strategic assets, enhancing efficiency, agility, and market responsiveness.

Notably, the study uncovered a new insight: even resource-constrained MSMEs can achieve operational sophistication comparable to larger firms when free AI adoption is combined with structured peer networks, institutional support, and vendor-facilitated freemium resources—a rarely documented phenomenon in the literature. Performance gains include unified dashboards replacing fragmented workflows, 10–12 AI-generated social posts weekly, sub-minute chatbot responses, and 15–30% reductions in advertising cost-per-acquisition, enabling same-day data-informed pivots.

These findings of freemium AI give access to a digital era of businesses. These findings aligned in supporting the achievement of the SDG 8 (Decent Work and Economic Growth), GD (Industry, Innovation and Infrastructure) and SDG 12 (Responsible Consumption and Production).

However, challenges remain, such as subscription creep, technical complexities like prompt engineering, and human adaptation to AI integration, which are

mitigated through community networks, government-sponsored training, and vendor support. Collectively, the findings validate the Dynamic Capabilities framework by demonstrating how sensing, seizing, and transforming capabilities function synergistically to convert digital experimentation into sustainable competitive advantage. Furthermore, this study contributes new knowledge by highlighting the exosystemic conditions—including peer learning, institutional scaffolding, and freemium support—that are critical to achieving systematic and resilient AI adoption, offering practical guidance for entrepreneurs, policymakers, and industry stakeholders aiming to foster inclusive, digitally-driven growth in the Philippine apparel sector.

TRANSLATIONAL RESEARCH

This study highlights how findings on free AI adoption by Philippine micro and small clothing enterprises can be communicated to diverse audiences through multiple forms of innovative and popular media. Scientific insights regarding the strategic use of AI tools, lean organizational structures, and digital-first market engagement can be translated into policy briefs for government agencies such as DTI and TESDA to inform support programs and digital skills initiatives.

To furtherly expand understanding, creative approaches, including storytelling, drama, and song, can convey the entrepreneurs' real-life experiences and make abstract concepts like Dynamic Capabilities Theory accessible and relatable. Visual media such as illustrated books, posters, and paintings can depict workflow transformations, AI dashboards, and social media marketing strategies, while video clips and radio plays can simulate real-time interactions with AI chatbots and automated advertising platforms, demonstrating practical benefits in a compelling, user-friendly manner.

Meanwhile, brochures and infographics can summarize step-by-step adoption frameworks, performance metrics, and peer learning practices, serving as practical guides for MSME owners. By employing a wide array of translational media, the study ensures that complex research findings are communicated beyond academic circles, empowering entrepreneurs, policymakers, and stakeholders to understand, adopt, and scale AI tools effectively, thereby bridging the gap between research evidence and practical application in the Philippine apparel industry.

LITERATURE CITED

Ahmed, S. (2024). Artificial Intelligence (AI) Technology Adoption in SME. *Artificial Intelligence (AI)*, *17*(01).

Alzaghal, Q. K., Salah, O. H., Ayyash, M. M., Kamal Alzaghal, Q., & Hasan Salah, O. (2024). Leveraging Artificial Intelligence for SMEs' sustainable Competitive Advantage: The Moderating Role of Managers Digital Literacy. *Journal of Theoretical and Applied Information Technology*, *102*(21).

Andrade, I. M. D., & Tumelero, C. (2022). Increasing customer service efficiency through artificial intelligence chatbot. *Revista de Gestão*, *29*(3), 238-251.

Appel, G., Grewal, L., Hadi, R., & Stephen, A. T. (2020). The future of social media in marketing. *Journal of the Academy of Marketing science*, *48*(1), 79-95.

Asiedu, E., Boakye, A. N., Malcalm, E., & Majeed, M. (2024, April). AI-Enabled Chatbot Integration on Business Process and Its Effect on Service Performance. In *International Conference on Advances in Information Communication Technology & Computing* (pp. 175-189). Singapore: Springer Nature Singapore.

Azmi, M., Mansour, A., & Azmi, C. (2023). A context-aware empowering business with ai: Case of chatbots in business intelligence systems. *Procedia Computer Science*, *224*, 479-484.

Banerjee, P. (2019). Analysing the existing challenges in the buying process of fashion retail industry and suggesting a possible solution using artificial intelligence.

Bundy, R., Moses, A., Stambaugh, E., Stewart III, P., Witek, L., Carlasare, L., ... & Dharod, A. (2024). Assessment of EHR efficiency tools and resources associated with physician time spent on the inbox. *Journal of General Internal Medicine*, *39*(13), 2432-2437.

Carayannis, E. G., Dumitrescu, R., Falkowski, T., Papamichail, G., & Zota, N. R. (2025). Enhancing SME resilience through artificial intelligence and strategic foresight: A framework for sustainable competitiveness. *Technology in Society*, *81*, 102835.

Clavel, C., & Callejas, Z. (2015). Sentiment analysis: from opinion mining to human-agent interaction. *IEEE Transactions on affective computing*, *7*(1), 74-93.

Creswell, J. (2012). Research design. https://d1wqtxts1xzle7.cloudfront.net/35757006/CreswellQualitative_quantitative_and_mixed_methods-libre.pdf

Cui, R., Gallino, S., Moreno, A., & Zhang, D. J. (2018). The operational value of social media information. *Production and operations management*, *27*(10), 1749-1769.

DeZao, T. (2024). Enhancing transparency in AI-powered customer engagement. *Journal of AI, Robotics & Workplace Automation*, *3*(2), 134-141.

Felix, G., & Gabriel, M. (2024). Artificial Intelligence-Driven Competitiveness: Enhancing SME Performance in the Global Market.

Garcia-Muiña, F. E., González-Sánchez, R., Ferrari, A. M., & Settembre-Blundo, D. (2018). The paradigms of Industry 4.0 and circular economy as enabling drivers for the competitiveness of businesses and territories: The case of an Italian ceramic tiles manufacturing company. *Social Sciences*, *7*(12), 255.

Giuggioli, G., & Pellegrini, M. M. (2023). Artificial intelligence as an enabler for entrepreneurs: a systematic literature review and an agenda for future research. *International Journal of Entrepreneurial Behavior & Research*, *29*(4), 816-837.

Grant, O. (2024). Exploring the Role of Artificial Intelligence in Supplier Relationship Management for E-commerce.

Gurjar, K., Jangra, A., Baber, H., Islam, M., & Sheikh, S. A. (2024). An analytical review on the impact of artificial intelligence on the business industry: Applications, trends, and challenges. *IEEE Engineering Management Review*, *52*(2), 84-102.

Hassan, A. (2021). The usage of artificial intelligence in digital marketing: A review. *Applications of Artificial Intelligence in Business, Education and Healthcare*, 357-383.

Hazen, B. T., Boone, C. A., Ezell, J. D., & Jones-Farmer, L. A. (2014). Data quality for data science, predictive analytics, and big data in supply chain management: An introduction to the problem and suggestions for research and applications. *International Journal of Production Economics*, *154*, 72-80.

Helo, P., & Hao, Y. (2022). Artificial intelligence in operations management and supply chain management: An exploratory case study. *Production planning & control*, *33*(16), 1573-1590.

Heo, M., & Lee, K. J. (2018). Chatbot as a new business communication tool: The case of naver talktalk. *Business Communication Research and Practice*, *1*(1), 41-45.

Hofmann, E., Sternberg, H., Chen, H., Pflaum, A., & Prockl, G. (2019). Supply chain management and Industry 4.0: conducting research in the digital age. *International Journal of Physical Distribution & Logistics Management*, *49*(10), 945-955.

Ifenthaler, D., Mah, D. K., & Yau, J. Y. K. (2019). Utilising learning analytics for study success: Reflections on current empirical findings. In *Utilizing learning analytics to support study success* (pp. 27-36). Cham: Springer International Publishing.

Joshi, S., Iyer, A., Patel, S., & Patel, P. (2023). Leveraging reinforcement learning and predictive analytics for optimizing ai-enhanced omnichannel retail strategies. *International Journal of AI ML Innovations*, *12*(3).

Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of advanced nursing*, *72*(12), 2954-2965.

Kern, J. (2021). The digital transformation of logistics: A review about technologies and their implementation status. *The digital transformation of logistics: Demystifying impacts of the fourth industrial revolution*, 361-403.

Khan, S. D., Kalaivani, K., Thakuria, D., Trivedi, H., Saikia, A., & Bora, B. (2025). Exploring The Role of Facebook in Supporting Senior Entrepreneurs: An Empirical Study. *Journal of Marketing & Social Research*, *2*, 202-208.

Kim, J. S., & Seo, D. (2023). Foresight and strategic decision-making framework from artificial intelligence technology development to utilization activities in small-and-medium-sized enterprises. *foresight*, *25*(6), 769-787.

Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing*. sage.

Li, N., & Wang, Z. (2023). Inventory control for omnichannel retailing between one warehouse and multiple stores. *IEEE Transactions on Engineering Management*, *71*, 7395-7412.

Luo, X., Tong, S., Fang, Z., & Qu, Z. (2019). Frontiers: Machines vs. humans: The impact of artificial intelligence chatbot disclosure on customer purchases. *Marketing Science*, *38*(6), 937-947.

Maier, U., & Klotz, C. (2022). Personalized feedback in digital learning environments: Classification framework and literature review. *Computers and education: Artificial intelligence*, *3*, 100080.

Mariani, M., & Borghi, M. (2021). Are environmental-related online reviews more helpful? A big data analytics approach. *International Journal of Contemporary Hospitality Management*, *33*(6), 2065-2090.

Marzban, J. (2024). Examining the Impact of Artificial Intelligence on Optimizing Customer Experience in Online Retail Stores. *Digital Transformation and Administration Innovation*, *2*(1), 30-37.

Medhat, W., Hassan, A., & Korashy, H. (2014). Sentiment analysis algorithms and applications: A survey. *Ain Shams engineering journal*, *5*(4), 1093-1113.

Miklosik, A., Evans, N., & Qureshi, A. M. A. (2021). The use of chatbots in digital business transformation: A systematic literature review. *Ieee Access*, *9*, 106530-106539.

Nascimento, D. L. M., Alencastro, V., Quelhas, O. L. G., Caiado, R. G. G., Garza-Reyes, J. A., Rocha-Lona, L., & Tortorella, G. (2019). Exploring Industry 4.0 technologies to enable circular economy practices in a manufacturing context: A business model proposal. *Journal of manufacturing technology management*, *30*(3), 607-627.

Ng, S. J. H., Rizal, A. M., Khalid, H., & Fei, T. C. (2021). Increasing customer satisfaction through omnichannel retailing. *Soc. Sci*, *11*(11), 696-707.

Patil, D. (2024). Artificial intelligence in retail and e-commerce: Enhancing customer experience through personalization, predictive analytics, and real-time engagement. *Predictive Analytics, And Real-Time Engagement (November 26, 2024).*

Pitelis, C. N., & Teece, D. J. (2010). Cross-border market co-creation, dynamic capabilities and the entrepreneurial theory of the multinational enterprise. *Industrial and corporate change*, *19*(4), 1247-1270.

Putra, J. E. (2025). Digital Transformation in Enhancing Operational Efficiency of E-Commerce Platforms in Southeast Asia: A Comprehensive Analysis and Strategic Implications. *TechTalent & Business Review*, *1*(2), 1-12.

Rawindaran, N., Jayal, A., & Prakash, E. (2021). Machine learning cybersecurity adoption in small and medium enterprises in developed countries. *Computers*, *10*(11), 150.

Sarker, I. H., Kayes, A. S. M., Badsha, S., Alqahtani, H., Watters, P., & Ng, A. (2020). Cybersecurity data science: an overview from machine learning perspective. *Journal of Big data*, *7*(1), 41.

Sestino, A., Prete, M. I., Piper, L., & Guido, G. (2020). Internet of Things and Big Data as enablers for business digitalization strategies. *Technovation*, *98*, 102173.

Shaw, C. J. (2025) Implementing AI-Driven Master Data Management Frameworks for Real-Time Data Synchronization and Enhanced Business Value. *Development (IJCSERD)*, *15*(1), 58-63.

Shi, M., Chussid, C., Yang, P., Jia, M., Dyk Lewis, V., & Cao, W. (2021). The exploration of artificial intelligence application in fashion trend forecasting. *Textile Research Journal*, *91*(19-20), 2357-2386.

Shoeb, M., & Zillul, M. (2025). Artificial Intelligence in Digital Marketing Enhancing Personalization and Consumer Engagement. *Business and Social Sciences*, *3*(1), 1-9.

Sun, X., Yu, H., & Solvang, W. D. (2022, October). Measuring the effectiveness of AI-enabled chatbots in customer service using anylogic simulation. In *International Workshop of Advanced Manufacturing and Automation* (pp. 266-274). Singapore: Springer Nature Singapore.

Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic management journal*, *28*(13), 1319-1350.

Teece, D. J. (2023). The evolution of the dynamic capabilities' framework. *Artificiality and sustainability in entrepreneurship*, *113*, 238.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic management journal*, *18*(7), 509-533.

Teece, D., Peteraf, M., & Leih, S. (2016). Dynamic capabilities and organizational agility: Risk, uncertainty, and strategy in the innovation economy. *California management review*, *58*(4), 13-35.

Trenkle, J. (2020). Digital Transformation in Small and Medium-Sized Enterprises.

Van Manen, M. (2016). *Researching lived experience: Human science for an action sensitive pedagogy*. Routledge.

Vashishth, T. K., Sharma, K. K., Kumar, B., Chaudhary, S., & Panwar, R. (2024). Enhancing customer experience through AI-enabled content personalization in e-commerce marketing. *Advances in digital marketing in the era of artificial intelligence*, 7-32.

Yi, Z., Cao, X., Chen, Z., & Li, S. (2023). Artificial intelligence in accounting and finance: Challenges and opportunities. *IEEE Access*, *11*, 129100-129123.

Zaber, M., & Rohman, I. (2025). Contextualizing AI Policy: How Nationally Tailored Strategies Drive Automation and Trade Competitiveness in ASEAN. *Available at SSRN 5382688*.

Asia, E. R. (2018). Study on MSMEs Participation in the Digital Economy in ASEAN. *Economic Research Institute for ASEAN and East Asia*.