

ENHANCING SME SALES USING THE TUMPENG LOCATIO BASED MARKETING APP

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Abstract: *The construction of the Medan–Rampah Toll Road has reduced traffic flow through the Pasar Bengkel area in Serdang Bedagai Regency, causing a significant decline in SME economic activity. The number of active kiosks decreased from 86 units with monthly revenue of Rp576,910,000 before the toll road development to 55 kiosks in 2023 with revenue of Rp135,670,900, and further declined to only 14 kiosks in 2025. This study aims to develop and evaluate the effectiveness of the Tumpeng application based on Location-Based Marketing (LBM) as a strategy to improve SME visibility and sales performance. Using an applied research approach with quantitative mixed methods, the study measured LBM exposure, application installations, transaction conversion, and system performance. Results show that 30,510 of 33,900 vehicles (90%) were exposed to LBM promotions, generating 3,478 valid application installations ($\pm 12\%$) and 316 transactions, with a conversion rate of 1.09% and overall system effectiveness of 85%. The implementation of LBM increased weekly kiosk sales from Rp2,422,695 to between Rp6,320,000 and Rp15,800,000. These findings indicate that the Tumpeng application has strong potential to enhance SME competitiveness, visibility, and revenue through location-based digital marketing, although improvements are still required to increase conversion rates from users to buyers.*

Keywords: *Aplication Tumpung, Location Based Marketing; Digital Marketing; Increased UMKM Sales; UMKM Bengkel Market;*

Abstrak: Pembangunan Jalan Tol Medan–Rampah telah mengurangi arus lalu lintas yang melintasi kawasan Pasar Bengkel di Kabupaten Serdang Bedagai, sehingga menyebabkan penurunan signifikan terhadap aktivitas ekonomi UMKM. Jumlah kios aktif menurun dari 86 unit dengan pendapatan bulanan sebesar Rp576.910.000 sebelum pembangunan jalan tol menjadi 55 kios pada tahun 2023 dengan pendapatan sebesar Rp135.670.900, dan kembali menurun hingga hanya tersisa 14 kios pada tahun 2025. Penelitian ini bertujuan untuk mengembangkan dan mengevaluasi efektivitas aplikasi Tumpeng berbasis Location-Based Marketing (LBM) sebagai strategi untuk meningkatkan visibilitas dan kinerja penjualan UMKM. Dengan menggunakan pendekatan penelitian terapan melalui metode campuran kuantitatif, penelitian ini mengukur tingkat paparan LBM, jumlah instalasi aplikasi, konversi transaksi, dan kinerja sistem. Hasil penelitian menunjukkan bahwa sebanyak 30.510 dari 33.900 kendaraan (90%) terpapar promosi LBM, yang menghasilkan 3.478 instalasi aplikasi valid ($\pm 12\%$) dan 316 transaksi, dengan tingkat konversi sebesar 1,09% serta efektivitas sistem secara keseluruhan mencapai 85%. Implementasi LBM mampu meningkatkan penjualan kios per minggu dari Rp2.422.695 menjadi antara Rp6.320.000 hingga Rp15.800.000. Temuan ini menunjukkan bahwa aplikasi Tumpeng memiliki potensi yang kuat dalam meningkatkan daya saing, visibilitas, dan pendapatan UMKM melalui pemasaran digital berbasis lokasi, meskipun masih diperlukan pengembangan lebih lanjut untuk meningkatkan tingkat konversi pengguna menjadi pembeli.

Kata kunci: Aplikasi tumpeng; Pemasaran Berbasis Lokasi; Pemasaran Digital; Peningkatan Penjualan UMKM; UMKM Pasar Bengkel

INTRODUCTION

The construction and operation of the Medan–Rampah Toll Road, as part of the Trans-Sumatra Toll Road network, which began operating gradually between 2017 and 2018, have significantly altered traffic flow patterns in Serdang Bedagai Regency. Prior to the toll road development, economic activities along the Trans-Sumatra Highway, particularly in the Pasar Bengkel area, flourished through the presence of SMEs (Small and Medium Enterprises) that had been operating since the 1970s. Records indicate that there were 86 active kiosks generating a total monthly revenue of Rp576,910,000. However, following the diversion of vehicle traffic to the toll road, the number of SMEs declined drastically to 55 kiosks in 2023, with total monthly revenue dropping to Rp135,670,900. By the end of 2025, only 14 active kiosks remained. This condition demonstrates the significant impact of infrastructure development on declining business revenues, business closures, and the weakening role of Pasar Bengkel as a regional economic and culinary tourism icon [1].

The decline in SME revenue is influenced by several factors, including a reduction in the number of customers due to changes in traffic flow, limited marketing strategies, suboptimal financial management, less strategic business locations, product quality issues, and increasing business competition. Therefore, an innovation is needed to address these challenges through the utilization of digital technology, enabling SMEs to expand market reach, enhance product visibility, improve customer engagement, and strengthen their competitiveness in an increasingly digital business environment [2].

As an effort to develop and increase the sales revenue of SMEs in the Pasar Bengkel area, this study proposes a digital marketing system through the Tumpeng (Tebar Produk UMKM Pasar Bengkel) application integrated with the

Location Based Marketing (LBM) concept. The system operates by utilizing strategically placed LBM points at three locations: the Trans-Sumatra Highway in Pasar Bengkel, the Rampah Rest Area toward Medan, and the Rampah Rest Area in the opposite direction [3]. Through these locations, the system delivers location-specific promotional information to travelers, thereby increasing the visibility of SME products and creating opportunities for greater customer engagement and sales transactions [4][5][6]. When users pass through these designated locations, the system automatically sends a notification containing a link to the Tumpeng application. Once users open the link, the application directly displays a variety of featured products offered by SMEs in the Pasar Bengkel area. This mechanism enables travelers to access product information conveniently and in real time, thereby increasing product visibility and encouraging potential purchasing decisions [7].

The hardware architecture of the Location-Based Marketing (LBM) system in the Tumpeng application is designed as an integrated platform capable of detecting, processing, and distributing location-based information in real time. The core hardware consists of a mini PC that functions as the central processing unit, running backend services and managing system operations. The mini PC is supported by networking modules, including Wi-Fi and Ethernet interfaces, to ensure stable internet connectivity for data communication and service delivery. This hardware infrastructure enables the system to process user location data, manage promotional content, and distribute notifications efficiently to users within designated coverage areas, thereby supporting the implementation of location-based marketing strategies for promoting SME products in the Pasar Bengkel area [5].

In addition, the system utilizes GPS and location services to determine users' geographic positions with a certain level

of accuracy, enabling notifications to be delivered precisely when users enter designated coverage areas. By continuously monitoring location data in real time, the system can identify users who are within the targeted marketing zone and automatically trigger promotional messages or application links. This mechanism ensures that marketing information is delivered to relevant users at the right location and time, thereby increasing the effectiveness of promotional campaigns and enhancing opportunities for user engagement and product transactions [7]. All system components are further supported by a power supply unit based on solar panels integrated with rechargeable batteries for energy storage. This configuration enables the system to operate independently and sustainably in field locations without relying entirely on conventional electrical infrastructure. The solar-powered energy system ensures continuous operation of the hardware components, including the mini PC, networking modules, and location-based services, while also improving system reliability, reducing operational costs, and supporting environmentally sustainable deployment [8]. The integration of these hardware components enables the Location-Based Marketing (LBM) system to operate optimally in capturing user exposure, delivering promotional content directly, and facilitating digital interactions between users and SMEs. Through real-time location detection, stable network connectivity, and reliable power support, the system can effectively distribute targeted marketing messages to potential customers within designated areas. This integrated infrastructure enhances product visibility, increases user engagement, and creates greater opportunities for digital transactions, ultimately contributing to improved sales performance and competitiveness of SMEs in the Pasar Bengkel area [9].

The success of the Tumpeng application in supporting SME development is evaluated using several

key indicators: (a) the number of vehicles passing through the designated LBM points, (b) the number of users who install the Tumpeng application, (c) the number of transactions or product orders conducted through the application, (d) application access speed and overall system performance, and (e) user evaluation results and feedback regarding the application. These indicators are expected to provide a comprehensive assessment of the system's effectiveness in enhancing product visibility, increasing customer engagement, and improving the sales performance of SMEs in the Pasar Bengkel area. By analyzing these metrics, the study can determine the extent to which the integration of Location-Based Marketing contributes to digital business growth and the sustainability of local SMEs.

METHOD

This study employs an applied research approach with a quantitative mixed-methods design, as the Tumpeng application is developed and evaluated to measure its impact on improving SME sales performance. The research will be conducted over a one-month period. The initial stage involves collecting data regarding the current condition of SMEs in the Pasar Bengkel area, including the number of active businesses, sales performance, and existing marketing practices. Subsequently, the Tumpeng application integrated with Location-Based Marketing (LBM) will be implemented and tested in the field. Data will be collected from system usage, user installations, transaction records, and user feedback to assess the effectiveness of the application. The results will be analyzed to determine the extent to which the application contributes to increasing product visibility, customer engagement, and sales growth among SMEs in Pasar Bengkel [10][11].

Calculation of Users Detected by Loca

tion-Based Marketing (LBM) Using GPS

$$K = U_{\text{geo}} - U_{\text{duplikat}} [12]$$

Installed Applications :

$$I = E \times CR_i$$

$$I_{\text{valid}} = I_{\text{total}} - D$$

$$IR = (I_{\text{valid}}/K) \times 100\%$$

Orders through the tumpeng application :

$$P = A \times CR_p$$

$$P_{\text{valid}} = P_{\text{total}} - D$$

$$P = K \times CR_{\text{LBM}}$$

Application Response Time Measurement :

$$T_{\text{load}} = T_{\text{res}} - T_{\text{req}}$$

$$T = (\sum T_{\text{load}})/n$$

$$V = S/T_{\text{load}}$$

Evaluation (effectivity) :

$$E \text{ fektivitas} = (\text{Aktual Result} / \text{Target}) \times 100\%$$

$$\text{Effectivity} = 85\% [13]$$

RESULT AND DISCUSSION

After conducting field observations at the Serdang Bedagai Rest Areas KM 37B and KM 37A, the results obtained are presented in the table below :

Table 1 Total Number of Vehicles at Rest Area Points KM 37A and KM 37B in the Serdang Bedagai Area

Day	Vehicles (8 Hours	90% LBM15–18% Passin	Visitors Transa	12–14%		
	Exposure	Through Rest Area	to STAN	tions	Application Installations	
Monday	3,200	2,880	1,024	102	25	346
Tuesday	3,900	3,510	1,365	150	37	421
Wednesday	3,500	3,150	1,085	98	24	378
Thursday	4,300	3,870	1,462	175	43	464
Friday	5,000	4,500	1,900	180	45	540
Saturday	7,200	6,480	2,880	346	86	778
Sunday	6,800	6,120	2,516	226	56	734
Total	33,900	30,510	12,232	1,277	316	3,661

The table illustrates the conversion flow from Location-Based Marketing (LBM) exposure to the installation of the Tumpeng application. Out of a total of 33,900 vehicles, 30,510 (90%) were exposed to LBM notifications, resulting in an estimated 3,661–4,271 application installations (12–14%). In this calculation, the parameters used were E (LBM exposure) = 30,510, CR_i (installation rate) = 12%–14%, D (duplicate users) = 5%, and K (unique users) = 28,985. Although the number of installations was relatively high, only 1,277 visitors interacted with the SME booth, and 316 completed transactions. These findings indicate a significant decline in conversion at the final stage of the customer journey and highlight the need for further optimization of marketing and engagement strategies to

improve user-to-customer conversion rates.

User detected by LBM (K)

$$K = 90\% \times \text{Kendaraan Jam 9 – 5 Sore.}$$

$$K = 0.9\% \times 3200 = 2880$$

Install Application

$$I = E \times CR_i$$

$$12\% \Rightarrow 30.510 \times 12\% = 3.661$$

$$I_{\text{valid}} = I_{\text{total}} - D$$

$$D = 5\%$$

$$12\% \Rightarrow 3.661 - 183 = 3.478$$

$$IR = (I_{\text{valid}} / K) \times 100\%$$

$$12\% \Rightarrow (3.478/28.985) \times 100\% = 12\%$$

Orders through Tumpeng :

$$P = A \times CR_p$$

$$CR_p = 316/1.277 = 24.7\%$$

$$P = 316 \text{ transaksi}$$

$$P_{\text{valid}} = P_{\text{total}} - D$$

$$D = 5\% \times 316 = 16$$

$$P_{\text{valid}} = 316 - 16 = 300 \text{ transaksi}$$

$$P = K \times CR_{LBM}$$

$$CRLB = 316 / 28.985 = 1.09\%$$

Speed application with 5 implement .

$$T_{load} = T_{res} - T_{req}$$

$$T_{load} = 2,3,3,4,2$$

$$T = (\sum T_{load})/n$$

$$T = (14/5) = 2.8$$

$$V = S/T_{load}$$

$$V = 1/2.8 = 0.36MB/S$$

Evaluation (Effectiveness) :

$$E \text{ fektivitas} = (\text{Result Actual} / \text{Target}) \times 100\%$$

$$\text{Efektivitas} = 85\%$$

$$= (316/372) \times 100\% = 85\%$$

Meanwhile, the Tumpeng application that has been developed is shown in the figure below :



Figure 1 Tumpeng Application Interface

The Tumpeng application is a Location-Based Marketing (LBM) platform developed to improve the visibility and sales performance of SMEs in rest area environments. By utilizing GPS technology, the application delivers real-time promotional information, product recommendations, and special offers from nearby SME booths. In addition to serving as a digital marketing tool, Tumpeng facilitates direct transactions between SMEs and consumers through integrated ordering features.

Research results indicate that the application achieved broad user reach and a satisfactory installation rate through LBM exposure, contributing to increased product visibility and customer engagement. Although the conversion rate from users to buyers requires further improvement, Tumpeng demonstrates strong potential as a digital solution for supporting SME marketing transformation and enhancing sales opportunities in strategic

locations.

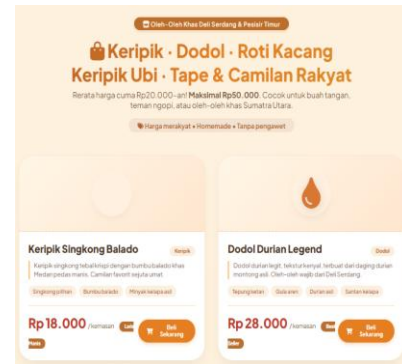


Figure 2 Interface website tumpeng

Figure 2 illustrates the Tumpeng application interface, which displays SME products, descriptions, prices, and direct ordering features to facilitate customer purchases. The application supports digital marketing and transaction activities by providing users with easy access to local SME products. Research results show that from 30,510 LBM exposures, the system generated 3,478 valid application installations and 316 transactions, producing a conversion rate of 1.09%.

Although the conversion rate remains relatively low, the platform successfully increased product visibility and customer engagement. Furthermore, the implementation of the Location-Based Marketing (LBM) system significantly improved SME sales performance, with average weekly revenue increasing from Rp2,422,695 to between Rp6,320,000 and Rp15,800,000. These findings demonstrate that the integration of LBM through the Tumpeng application has strong potential to enhance product visibility, attract customers, and increase SME revenue in the Pasar Bengkel area.



Gambar 3 Deployment points LBM

Figure 3 presents the deployment map of Location-Based Marketing (LBM) points for the Tumpeng application along strategic routes in Serdang Bedagai, including the Pasar Bengkel corridor and the KM 37A–37B rest areas. These GPS-based locations enabled the system to reach 30,510 vehicle exposures (90% of 33,900 vehicles), generating 28,985 unique users, 3,478 application installations, and 316 transactions. The results demonstrate that strategically placed LBM points effectively increase user reach, application engagement, and customer conversion, supporting the marketing performance of local SMEs.



Figure 4 Interface Hardware LBM

Figure 4 shows the LBM hardware system supporting the Tumpeng application, consisting of a mini PC, network modules, and a power supply integrated into a single unit. The system detects users based on geographic location and delivers real-time promotional notifications. Based on the technical specifications, it uses a mini PC with an Intel/ARM processor (≥ 1.5 GHz), 4 GB RAM, and 64–128 GB SSD storage, supported by Wi-Fi (2.4/5 GHz), Ethernet, and GPS with ± 5 –10 meter accuracy. The system operates with a power consumption of 30–60 watts and 220V AC input, ensuring stable and continuous performance for LBM-based promotion and user engagement..

CONCULLASION

The authors would like to express their sincere gratitude to the Ministry of

Research, Technology, and Higher Education (Ristek Dikti) for their support, funding, and the opportunities provided in conducting this research. This support has played a crucial role in the development of the Tumpeng application as a digital innovation aimed at improving the competitiveness and revenue of SMEs in the Pasar Bengkel area. It is hoped that the results of this study will make a meaningful contribution to the advancement of science and technology, as well as to the empowerment of the local economy.

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