



Digital upskilling of tourism MSMEs: the impact of booking and analytics training on sales performance and empowerment in Biak Numfor Tourism Village, Papua

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ARTICLE INFO:

Received: 25-09-2025

Review: 15-10-2025

Accepted: 30-11-2025

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Keywords:

Biak Numfor; digital upskilling; empowerment; MSMEs; tourism development

DOI:

ABSTRACT

Digital upskilling is increasingly vital for tourism micro, small, and medium enterprises (MSMEs) in peripheral destinations. This study investigates the impact of booking management and analytics training on the sales performance and empowerment of tourism MSMEs in Biak Numfor, Papua, Indonesia. Using a participatory case study design, data were collected from 30 MSME actors through pre–post surveys, interviews, and platform analytics. Findings reveal significant improvements in booking rates (+27%) and monthly revenue (+19%), alongside a measurable increase in self-reported empowerment scores (from 3.1 to 4.2 on a 5-point Likert scale). Qualitative results show enhanced confidence in digital tools, stronger collaboration among MSMEs, and improved responsiveness to tourist demands. This paper contributes a replicable training module and an empowerment measurement rubric tailored to remote tourism contexts. The study emphasizes the role of digital literacy as a catalyst for sustainable and inclusive tourism development.

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How to cite: Maulana, M. S. ., Pratiwi, D., & Muttaqin, M. R. (2025). Digital Upskilling for Tourism MSMEs: The Impact of Booking & Analytics Training on Sales Performance and Empowerment in Biak Numfor Tourism Village, Papua. *Abdikata: Jurnal Abdi Loka Wisata*, 1(01). Retrieved from <https://jurnal.unmer.ac.id/index.php/abdikata/article/view/16213>

Introduction

Tourism is one of the strategic sectors that plays an important role in regional economic development in Indonesia. The contribution of this sector is increasingly prominent in the eastern region, including Biak Numfor Regency, Papua, which has potential for marine tourism, culture, and World War II history. However, the economic contribution of local tourism has not been optimal because the involvement of micro, small, and medium enterprises (MSMEs) is still limited, especially in the use of digital technology (Arismayanti et al., 2019). Low digital literacy makes it difficult for MSMEs to market their products and services through online platforms, manage

booking systems, or utilize simple analytical data to understand tourist behavior. This condition results in low occupancy rates, limited promotion, and dependence on traditional marketing methods.

In the framework of sustainable tourism development, empowering local communities through digital capacity building is a crucial strategy. Digital literacy not only improves the technical skills of MSMEs but also strengthens economic independence, expands market access, and increases the competitiveness of destinations (Khalid, Ahmad, Ramayah, Hwang, & Kim, 2019). A study by Lee and Jan (2019) confirms that the integration of technology in community-based tourism (CBT) practices can improve tourism sustainability and the quality of tourist experiences. Furthermore, Scheyvens (1999) explains that empowerment in tourism encompasses economic, social, psychological, and political dimensions, so that digitization programs should influence more than just financial aspects.

Although a number of studies have highlighted the impact of digitization on MSMEs in various regions, the majority of studies have been conducted in destinations with adequate digital infrastructure such as Bali, Yogyakarta, and West Java (Novianti, 2021; Streimikiene, Svagzdiene, Jasinskas, & Simanavicius, 2021). To date, there are still few empirical studies on the impact of digital training on tourism MSMEs in peripheral areas such as Biak Numfor, Papua. In fact, the geographical and socio-cultural characteristics, as well as infrastructure limitations in eastern Indonesia, require an adaptive approach. Therefore, this study aims to examine the effectiveness of digital upskilling programs—which include training in online booking management and simple analytics—on the sales performance and empowerment of tourism MSMEs in Biak Numfor. The results of this study are expected to provide conceptual and practical contributions in designing relevant digital training models, while strengthening the basis for community-based sustainable tourism in peripheral areas of Indonesia.

Method

This study uses a participatory case study approach with a quantitative-qualitative (mixed methods) design. This design was chosen based on the need to not only measure the impact of training numerically, but also to understand the experiences, perceptions, and behavioral changes of MSMEs after the intervention. The study was conducted in the tourist village of Biak Numfor, Papua, which has marine, cultural, and historical tourism potential. The research participants consisted of 30 tourism SME actors, including homestay providers, local culinary providers, tourist transportation providers, and culture-based attraction providers. Participants were selected using purposive sampling based on the following criteria: (1) SMEs that had been active for at least one year, (2) had an interest in using digital technology, and (3) were willing to participate in the entire training program.

The training intervention was carried out in three main sessions with a total duration of 24 hours of face-to-face sessions and field practice. The first session focused on online booking management through the use of Google My Business, Traveloka, and Agoda applications to manage business profiles, prices, and availability. The second session provided training on simple analytics, including an introduction to traffic metrics, click-through rates, and the use of customer reviews as business performance indicators. The third session focused on digital promotion strategies, including simple content creation practices, review management, and collaboration between MSMEs through online platforms.

The research instruments used included pre- and post-surveys, designed to measure booking rates, monthly income, and empowerment scores using a 1–5 Likert scale. In addition, the study

also utilized digital analytics data, such as the number of visits, booking conversion rates, and customer reviews from online business accounts. In-depth interviews were conducted to explore participants' experiences, barriers to technology use, and the psychological and social impacts that arose after the intervention. Meanwhile, participatory observation was used to record the dynamics of the training, interactions between participants, and behavioral changes after the training.

The data obtained was analyzed by combining quantitative and qualitative methods. Quantitative analysis was performed using descriptive statistics and paired t-tests to compare differences in booking rates, income, and empowerment scores before and after training. Qualitative analysis was conducted through thematic analysis of interview transcripts and observation notes, so that patterns of attitude change, challenges, and program success factors could be identified. To increase validity, the study applied data triangulation, which is the combination of survey results, digital analytics, and interviews.

In addition, this study adhered to research ethics principles by: obtaining written informed consent from all participants, ensuring confidentiality of identity, giving participants the right to withdraw at any time, and ensuring that the research results were accessible to the community as a form of social accountability.

Results and Discussion

The implementation of digital training (digital upskilling) has been proven to bring significant changes to the performance indicators of tourism MSMEs in Biak Numfor. Data obtained through pre- and post-surveys and digital platform analytics show a consistent upward trend in three main aspects, namely booking rates, monthly income, and empowerment scores.

Before the training, the average booking rate for MSMEs was 58%. After the intervention, this value increased to 73%, which means there was an increase of 15 points or about 27%. This increase shows that the active use of online booking applications such as Traveloka and Agoda was able to expand MSME market access, thereby increasing tourist visitation opportunities. In terms of income, there was an increase from IDR 3.8 million to IDR 4.5 million per month, or around 19%. Although the nominal increase seems relatively small, it is very significant for micro-scale MSMEs that usually only rely on conventional promotion. This increase in income shows the multiplier effect of the increase in the number of bookings on the financial stability of MSMEs.

Furthermore, this training had a positive impact on the empowerment of MSME actors. The empowerment score, measured on a 1-5 Likert scale, increased from 3.1 to 4.2, or by approximately 35%. This increase not only reflects greater self-confidence, but also indicates a growing sense of ownership, active participation, and independence in managing digital-based businesses. Paired t-tests reinforce these findings, with all three indicators showing statistically significant differences ($p < 0.05$). Thus, it can be concluded that the training program has succeeded in tangibly improving the economic performance and socio-psychological capacity of MSMEs.

In addition to quantitative findings, in-depth interviews and participatory observations conducted during and after the training revealed a number of important patterns that enriched the understanding of the intervention's impact. Increased confidence. Many participants admitted that before the training, they were hesitant or even afraid to try managing online business accounts. After the training, they felt more confident in using digital applications. One homestay operator said, "Now we no longer wait for guests to come directly, but already know how to list

rooms on the application." This statement reflects a shift in mindset from passive to proactive in seeking market opportunities.

Collaboration between MSMEs. One notable impact is the emergence of new collaborations among participants. Several MSMEs have begun collaborating to create integrated tour packages, such as combinations of accommodation, local transportation, and local cuisine. This collaboration increases the competitiveness of Biak Numfor as a destination by offering a more complete tourist experience. It also shows that the training not only improves individual capacity but also encourages the formation of social networks that strengthen the community.

Responsiveness to tourists. By utilizing the customer review feature on digital platforms, MSMEs have become quicker to respond to market needs. For example, a local cafe changed its menu after reading comments from foreign tourists who wanted a variety of healthy foods. This change proves that simple analytics, such as reading reviews, can be used as a tool for reflection to improve services.

Technical barriers. Despite much progress, infrastructure challenges remain a major obstacle. Limited internet connectivity in some locations makes it difficult to upload content or synchronize data in real time. Some MSMEs are forced to wait for a certain time when the signal is stronger to update information, which has the potential to reduce the consistency of digital services. These obstacles emphasize the need for more adequate policy and infrastructure support so that digital transformation can run optimally in Biak Numfor.

Overall, these qualitative results reinforce the quantitative findings that digital upskilling not only impacts economic indicators but also social and psychological dimensions, such as self-confidence, community solidarity, and service adaptation. However, the technical challenges faced emphasize that digitization in peripheral areas requires a contextual and sustainable approach.

Table 1. Changes in indicators before and after the Biak Numfor Tourism MSME digital training

Indicator	Before (Mean)	After (Mean)	Change	% Δ
Booking rate (%)	58	73	+15	+27
Monthly revenue (Rp million)	3.8	4.5	+0.7	+19%
Empowerment score (Likert 1-5)	3.1	4.2	+1.1	+35%

The results of the paired t-test show that the differences in the three indicators are significant ($p < 0.05$). This means that the training has succeeded in significantly improving the economic performance and socio-psychological capacity of MSMEs.

Discussion

The results of the study in Biak Numfor show that digital training can be a significant lever for improving the performance of tourism MSMEs, even when conducted in areas with limited infrastructure. These findings can be understood through comparison with international studies that emphasize the role of digital literacy in community-based tourism development. On the one hand, the Biak Numfor experience is in line with the homestay tourism program in Thailand, which emphasizes community participation in managing online platforms to increase occupancy (Kontogeorgopoulos, 2014). Both cases confirm that access to digital markets can expand the reach of tourists and increase local income, even in the context of rural or remote communities.

Furthermore, the efforts of Biak Numfor MSMEs to adopt simple analytics, such as reading customer reviews and monitoring booking conversions, are similar to eco-tourism entrepreneurship practices in Costa Rica. Jones and Spadafora (2017) show that community

involvement in ecotourism analytics can improve service quality while strengthening conservation commitments. This is reflected in Biak Numfor, where SME actors have begun to adjust their culinary menus or tour packages based on tourist feedback, demonstrating a customer-oriented mindset. From an empowerment perspective, this study reinforces Scheyvens' (1999) theory that psychological and social empowerment grows when communities have control over tourism business processes. Training participants in Biak Numfor reported increased confidence in using digital applications and began forming cross-MSME collaborations to create integrated tour packages. This is a strong indicator that digital interventions have an impact not only on the economy but also on social capital and community cohesion.

On the other hand, the main difference between Biak Numfor and studies in Thailand and Costa Rica lies in infrastructure constraints. Weak internet signals and limited devices are real challenges. This underscores the importance of a contextual approach, where digital upskilling programs cannot be separated from local policy support, infrastructure investment, and hybrid offline–online models. For example, manual recording is still necessary to back up transactions when connectivity is disrupted.

Thus, this study not only confirms international findings but also expands the literature by showing how digital upskilling can be adapted in peripheral areas. Biak Numfor is an important case study for understanding how digital innovation can bridge the gap between tourism potential and structural limitations, as well as affirming the relevance of the pentahelix model in ensuring program sustainability.

Conclusion

This study shows that *digital upskilling* training focused on online booking management and simple analytics has a real impact on the performance of tourism MSMEs in Biak Numfor. Quantitative results prove a significant increase in *booking rates* (+27%), monthly income (+19%), and empowerment scores (+35%). Meanwhile, qualitative results reveal that MSMEs have become more confident in using technology, have begun to collaborate across businesses, and are more responsive to tourist needs.

These findings reinforce the relevance of empowerment theory (Scheyvens, 1999) and international practices (Thailand, Costa Rica) to the local context of Papua. Despite the limitations of digital infrastructure remaining a challenge, this study shows that digitalization can be an important catalyst for community-based sustainable tourism in peripheral regions.

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