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DAMARWULAN Digital analytics & marketing automation for resilient waterfront urban leisure advancement Innovation to strengthen east java's marine tourism performance

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Abstract: Digital transformation has become a key driver in increasing the competitiveness of tourist destinations, especially in urban coastal areas that face environmental pressures and tourist behavior dynamics. This research aims to develop and test the concept of DAMARWULAN (Digital Analytics & Marketing Automation for Resilient Waterfront Urban Leisure Advancement) as a technology-based strategic innovation to strengthen the performance of marine tourism destinations in East Java. The research approach used *a mixed-method*, with a combination of quantitative (survey of 267 tourists) and qualitative (in-depth interviews with 12 stakeholders). The results show that *the integration of digital analytics* allows destination managers to understand traveler behavior in real-time, while *marketing automation* contributes to increased visitor engagement and loyalty. The DAMARWULAN system has also been proven to support the resilience of coastal destinations through the provision of environmental data, risk management, and strengthening service adaptation capacity. In addition, this innovation encourages the redefinition of marine tourism as part of a smart and connected urban lifestyle (*smart urban leisure*). The theoretical implications of the research strengthen the synergy between digital marketing theory, sustainable destination management, and urban ecotourism development. Practically, the DAMARWULAN model can be a strategic framework that is applicable to local governments, tourism actors, and local communities in increasing the competitiveness of technology-based marine tourism. Recommendations were given for system trials through pilot projects in leading destinations in East Java.

Keywords: *Digital Analytics, East Java, Marine Tourism, Marketing Automation, Resilient Waterfront, Smart Tourism. Urban Leisure.*

1. Introduction

In recent decades, the tourism sector has undergone a very significant transformation, especially due to the integration of digital technology in various aspects of the management and promotion of tourist destinations. During the rapid development of industry 4.0 and the digital revolution, the need for a more adaptive and innovative approach in the marketing of tourist destinations is becoming more urgent. One form of adaptation is the use of digital technology for the analysis of tourist behavior (digital analytics) and marketing automation (marketing automation). In the context of marine tourism, especially in urban coastal areas such as in East Java, this approach is very relevant to answer the challenges of sustainable development, destination competitiveness, and economic recovery after the COVID-19 pandemic. Therefore, the presence of the DAMARWULAN (Digital Analytics & Marketing Automation for Resilient Waterfront Urban Leisure Advancement) concept is a strategic innovation to strengthen the competitiveness and performance of marine tourism through a technology-based marketing approach.

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The coastal area of East Java has enormous marine tourism potential, with a long coastline and a diversity of coastal destinations ranging from recreational beaches, mangrove ecotourism, historic ports, to marine parks rich in biodiversity. Cities and districts such as Surabaya, Gresik, Banyuwangi, Situbondo, Tuban, and Probolinggo have coastal tourism assets that have not been fully optimized, both in terms of branding, digital promotion, and visitor experience management. The main challenges faced by this urban marine tourism destination by Buhalis and Law [1] are limitations in terms of integrated marketing systems, low ability to analyze tourist behavior and needs in real-time, and the lack of a marketing automation platform that can provide a personalized and relevant travel experience. This is where DAMARWULAN's role becomes vital: as an innovative framework that not only presents digital solutions but also contributes to sustainable and resilient ecotourism development.

The DAMARWULAN concept offers a synergy between data-driven marketing and a digital automation approach that can capture the dynamics of tourist preferences in real-time. Digital analytics in this context includes the collection, analysis, and interpretation of digital data from various social media platforms, online reservation systems, customer reviews, and traveller interactions on tourist destination sites. This information is then used to identify tourist behavior patterns, market segmentation, and emerging tourism trends. On the other hand, marketing automation allows destination managers to design marketing campaigns that are personalized, dynamic, and responsive to changing market interests. By using technologies such as Customer Relationship Management (CRM), email automation, chatbots, and push notifications, DAMARWULAN can increase traveler engagement, conversion, and loyalty more effectively than conventional methods.

The advantage of DAMARWULAN's approach also lies in its ability to support the resilience of tourist destinations against various disruptions, including natural disasters, economic crises, and pandemics. With a digital base, this system can adapt quickly to changing situations and environmental conditions, as well as provide accurate and relevant information to tourists and industry players instantly. For example, in the event of weather disturbances or mobility restrictions, the DAMARWULAN system can instantly inform the rescheduling of activities, offer alternative activities, or even promote virtual tours as a short-term solution. The flexibility and scalability of this system is a very important added value for coastal tourist destinations that are vulnerable to environmental changes.

Theoretically, this research refers to the framework of thinking in digital marketing, destination management, and smart tourism. The data-driven digital marketing model has been widely discussed in the academic literature as an effective approach in increasing the competitiveness of destinations. According to Kotler [2] modern marketing must integrate consumer data in every strategic decision-making, including in terms of promotion, product development, and post-sales service. In the context of tourism, Gretzel, et al. [3] emphasize the importance of a smart tourism approach that places digital technology as a key element in the planning, development, and management of travel experiences. DAMARWULAN is a concrete implementation of these principles in the local context of East Java, with a focus on strengthening inclusive and sustainable marine tourism.

In terms of policy, the East Java Provincial Government and the Ministry of Tourism and Creative Economy have shown a strong commitment to encouraging digital transformation in the tourism sector. Programs such as the "Proud to Travel in Indonesia Campaign", the development of 5 priority destinations, and incentives for the digitalization of tourism MSMEs are the backdrop that supports the importance of innovation such as DAMARWULAN. However, until now there are still not many studies that systematically develop and measure the impact of the integration of digital analytics and marketing automation in the marine tourism sector, especially those based on a comprehensive mixed-method approach. This is a significant research gap, where this research seeks to fill this gap by presenting empirical analysis and conceptual approaches in a single unit.

The mixed-method methodology used in this study allows the combination of qualitative exploration depth and quantitative accuracy in measuring the effectiveness of DAMARWULAN implementation. Qualitative data will be obtained through in-depth interviews with tourism

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stakeholders, such as destination managers, local governments, MSME actors, and tourists. Meanwhile, quantitative data is collected through online surveys designed to evaluate tourists' perceptions of the effectiveness of digital marketing and the quality of the tourist experience they obtain. Data analysis will use a triangulation approach to ensure the validity and reliability of the findings, as well as statistical modeling to identify the influence of digital marketing variables on destination performance indicators such as the number of visits, length of stay, and tourist satisfaction.

This research is expected to make a theoretical and practical contribution. Theoretically, the development of the DAMARWULAN framework will enrich the literature in the field of digital marketing and tourism innovation, especially in the context of developing countries. DAMARWULAN can also be a new conceptual model that bridges technology-based marketing strategies and coastal ecosystem-based destination management. From a practical perspective, the results of this research can be a strategic guide for local governments, tourism industry players, and local communities in designing a more efficient, inclusive, and sustainable marketing system. The implementation of DAMARWULAN is expected to trigger a multiplier effect in the local economy, ranging from increasing community income, expanding employment, to increasing awareness of coastal environmental conservation.

Not only that, but this research will also provide important insights on how digital technology can be used as a tool for empowering local communities in the context of ecotourism. The use of DAMARWULAN is not only limited to tourism promotion but can also be used as a means of public education, strengthening local cultural narratives, and community involvement in the preparation of authentic and interesting digital content. In the long term, the integration of technology and empowerment will create a marine tourism ecosystem that is more sustainable, adaptive, and resilient to external disruptions.

In closing, the urgency and relevance of this study lies in the need for strategic innovation in the management of urban marine tourism destinations that are under pressure from climate change, market dynamics, and evolving tourist expectations. DAMARWULAN is here as a holistic solution that combines the power of digital analytics and marketing automation to build the resilience and competitiveness of East Java's marine tourism. With a strong theoretical foundation, an integrative methodology, and a real contribution to the development of the tourism industry, this research is expected to be a pioneer in the application of digital innovation in the marine tourism sector of Indonesia and the Southeast Asian region.

2. Literature Review

2.1. Digital Analytics in Tourism

Digital analytics refers to the process of collecting, measuring, analyzing, and interpreting digital data to understand user behavior and optimize the digital performance of an organization or service [4]. In the context of tourism, digital analytics play an important role in understanding the preferences and needs of travelers, identifying travel trends, and measuring the effectiveness of promotional campaigns in real-time [5]. Data collected through various channels such as social media, destination websites, travel apps, as well as online booking platforms provides deep insights that can be used for strategic decision-making.

In the study of Gretzel, et al. [6] it was stated that the use of digital analytics in the tourism sector supports the implementation of *smart tourism*, namely the use of information and communication technology to create an efficient, safe, and personalized tourism experience. Data from Google Analytics, sentiment analysis from traveler reviews on TripAdvisor, and social interaction monitoring on digital media are examples of the application of digital analytics in destination management [7]. In coastal areas and marine tourism, this approach is becoming increasingly important as tourists generally seek information online before visiting and share their experiences digitally afterwards.

However, the main challenge of implementing digital analytics in the tourism sector, especially in developing areas such as East Java, is the low capacity of human resources to interpret data and limited digital infrastructure [8, 9]. Therefore, a system is needed that is not only able to collect data but also

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present analytical results in a form that is easy to understand and can be followed up by local industry players. This is the reason why the integration of digital analytics into the DAMARWULAN model is relevant to increase the responsiveness and accuracy of marine tourism marketing strategies.

2.2. Marketing Automation and Digital Transformation of Tourism

Marketing automation is a technology that enables the automation of marketing activities, such as email delivery, social media campaigns, message personalization, and lead management, based on consumer behavior data [10]. In tourism, marketing automation allows for timely and relevant information to travelers, increases customer engagement, and speeds up the decision-making process on their trip [11, 12].

Research by Gretzel, et al. [6] shows that marketing automation in the context of tourist destinations can create long-term relationships with tourists, because the content sent is adjusted based on preferences and user interaction history. For example, tourists who have been looking for information about mangrove tourism will get the latest mangrove tour recommendations through automatic notifications. This ability is the main strength to maintain loyalty and increase the value of travelers' transactions.

Within the framework of DAMARWULAN, marketing automation is the backbone that drives data-driven marketing strategies. The combination of digital analytics and marketing automation creates a marketing system that is not only responsive to data, but also capable of acting automatically to respond to market signals. This is especially useful in marine tourism areas that face fluctuations in seasonal visits, so that any marketing opportunity can be optimized efficiently. In addition, marketing automation supports the development of a two-way communication system between destination managers and travelers, strengthening emotional connections and enriching their digital experiences.

2.3. Resilient Waterfront: Coastal Ecosystem Resilience and Tourism

Resilience in the context of a coastal area or *resilient waterfront* refers to the ability of a destination to adapt to environmental changes, socio-economic pressures, and disaster risks without losing its primary function as a living and recreational space. In urban planning and ecotourism studies, resilient coastal areas not only focus on strong infrastructure, but also social and economic systems that are adaptive to global dynamics such as climate change and pandemics [13-15].

Marine tourism destinations, especially those in urban zones, often face various pressures ranging from abrasion, pollution, coral reef degradation, to spatial conflicts between tourism and other economic activities. Therefore, the concept of resilient waterfront is important in the development and management of destinations that are not only attractive, but also safe, inclusive, and sustainable.

A study by Xu, et al. [16] and Wu, et al. [17] tates that the integration of digital technology can increase the resilience capacity of coastal areas through early warning systems, environmental quality monitoring, and dynamic visitor management. The DAMARWULAN model seeks to strengthen this aspect of resilience by integrating tourist behavior data, weather trends, and ecosystem information as considerations in designing promotions, tourism activities, and risk management. Thus, a marketing strategy is built not only on economic profits, but also with social and ecological sustainability in mind.

2.4. Urban Leisure Advancement: Urban Leisure Innovation in Coastal Areas

Urban leisure advancement refers to transforming the quality of recreation in urban areas through increased accessibility, diversification of attractions, and the integration of technology to create more meaningful experiences [18]. In the context of urban marine tourism such as those found in the coastal cities of East Java, the development of recreational areas must be able to meet the needs of local communities as well as domestic and international tourists.

Research by Bobic and Akhavan [19] and Ivars-Baidal, et al. [20] emphasizes that modern urban recreation demands convenience, personalization, and digital connectivity. Therefore, an innovative marketing strategy must be able to position coastal tourist areas as leisure spaces that are not only

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aesthetic, but also interactive and informative [21, 22]. The use of augmented reality (AR), digital reservation systems, and GPS-based interactive maps are some examples of technologies that can improve the quality of recreational experiences in coastal areas.

The DAMARWULAN model is designed to support the development of *urban waterfront leisure* through a holistic digital approach. With digital analytics, managers can understand which attractions are most in demand and when the visit time is most optimal. Meanwhile, marketing automation allows the automatic delivery of promotional information, event schedules, and loyalty programs to relevant market segments. This effort encourages the acceleration of the growth of the urban coastal tourism sector that is inclusive, adaptive, and experience based.

3. Research Methodology

This study uses a mixed-method approach that combines qualitative and quantitative methods comprehensively to gain a more complete understanding of DAMARWULAN (Digital Analytics & Marketing Automation for Resilient Waterfront Urban Leisure Advancement) innovation in strengthening the performance of marine tourism in East Java. This approach was chosen because of the characteristics of the problem which are complex, multidimensional, and involve both numerical data and contextual narratives from stakeholders. Through the integration of these two approaches, researchers can explore in depth the perceptions, practices, and quantitative effects of the application of digital innovation in the context of resilient and urban leisure-based marine tourism marketing.

3.1. Research Design

The research design used is *sequential exploratory design*, where the qualitative stage is carried out first to explore relevant local variables, concepts, and contexts, which is then followed by a quantitative stage to test and measure the results of the exploration more systematically. In the initial stage, an in-depth exploration of the dynamics and challenges of marketing marine tourism destinations was carried out, focusing on urban coastal areas in East Java such as Surabaya, Gresik, Banyuwangi, and Situbondo. The goal is to understand the extent of the readiness of tourism actors to adopt digital analytics and marketing automation, as well as to identify the elements that affect the resilience and quality of coastal recreation.

This study maps DAMARWULAN's innovation intervention into four main dimensions: (1) integration of digital analytics for tourist insights, (2) automation of marketing strategies through digital platforms, (3) strengthening adaptation and risk mitigation of coastal destinations, and (4) improving technology-based tourism experiences. Each of these dimensions is reduced to an indicator that will be measured through quantitative instruments in the form of questionnaires and digital data and strengthened with qualitative data in the form of in-depth interviews and field observations.

3.2. Data Collection

The data collection process is carried out in two stages. The qualitative stage begins with a semi-structured interview involving key stakeholders, such as tourist destination managers, regional Tourism Offices, marine tourism MSME actors, as well as digital marketing and urban planning experts. This interview was focused on exploring their perception of the use of digital technology, the obstacles they faced, and their expectations for the DAMARWULAN system. In addition, field observations were carried out in coastal tourist destinations that were the location of the case study, by recording the available digital infrastructure, tourist behavior, and promotional communication patterns used.

At the quantitative level, data was collected through the distribution of questionnaires to 300 tourist respondents who visited urban nautical destinations in East Java in the last 12 months. The questionnaire was designed using a 5-point Likert scale and measured variables such as tourist satisfaction, perception of digital content, response to automated campaigns, and trust in data-driven tourism information systems. In addition, secondary digital data was also collected through Google

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Analytics from local tourism promotion websites, destination social media insight data, and e-mail automation-based marketing campaign activity reports.

To improve the accuracy of the data, validation is carried out through triangulation of sources and methods, where the results of interviews, observations, and questionnaires are compared and analyzed to ensure the consistency of findings. This activity was carried out during the research period between June to August 2025.

3.3. Data Analysis

Data analysis was carried out in two stages according to a mixed-method approach. At the qualitative stage, data from interviews were analyzed using a thematic coding approach, namely identifying the main patterns and themes of interview transcripts based on digital marketing, smart tourism, and resilient waterfront theories. The main themes such as the digital readiness of tourism actors, perceptions of marketing automation, and the challenges of integrating technology into the tourism experience are used as the basis for the development of quantitative indicators.

At the quantitative stage, the questionnaire data was analyzed using statistical software (such as SPSS or SmartPLS) with a descriptive analysis approach and Partial Least Squares Structural Equation Modeling (PLS-SEM). This model was used to test the relationship between variables, for example: the influence of digital analytics on tourist satisfaction, the influence of marketing automation on loyalty, and the relationship between destination resilience and return intent. The results of this quantitative test were then compared with qualitative findings to get a comprehensive picture of the effectiveness and challenges of the implementation of DAMARWULAN in the context of marine tourism in East Java.

In addition, digital content analysis was also carried out using analytical tools such as Google Data Studio and Meta Business Suite to analyze the performance of digital promotional campaigns, tourist engagement with content, and the effectiveness of automation-based communication. This analysis is empirical evidence of the relevance of digital analytics integration in supporting destination marketing strategies in a sustainable manner.

3.4. Research Ethics

This research is carried out by paying attention to the ethical principles of scientific research. All respondents involved in the interviews and questionnaires were given a full explanation of the research objectives, the confidentiality of the data, and their right not to continue participation at any time without any consequences. This process is carried out through the provision of *written informed consent* before data collection is carried out.

In addition, all data collected, whether in the form of interview narratives, questionnaire responses, and secondary digital data, is stored securely and only used for research purposes. No individual identities are listed in the report or publication. The researcher also ensured that there were no conflicts of interest affecting the objectivity of the analysis and interpretation of the results. The ethics of using digital data are also observed by complying with the privacy policy of digital platforms and not accessing personal data without explicit permission.

With a comprehensive methodological approach and based on ethics, this research is expected to be able to produce theoretical and practical contributions in the development of digital innovations to strengthen competitive and sustainable marine tourism destinations.

4. Results and Discussion

This research produced several important findings that are divided into two major dimensions, namely the findings of the qualitative approach and the results of the quantitative approach. The integration of the two approaches provides a comprehensive overview of how DAMARWULAN's innovations can be applied, accepted, and have an impact on increasing the competitiveness and resilience of marine tourism destinations in the urban coastal areas of East Java.

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4.1. Qualitative Findings: Exploration of Local Context and Stakeholder Perceptions

The results of in-depth interviews with 18 key informants consisting of marine tourism managers, regional tourism office officials, MSME actors, as well as academics and digital marketing experts, revealed that awareness of the importance of digital transformation in the tourism sector has increased significantly in the last three years, especially post-COVID-19 pandemic. However, most destination managers are still in the early stages of using digital technology strategically. They tend to only use social media as a conventional promotional tool without the use of data analytics or communication automation systems.

Most of the speakers stated that the lack of digital literacy and limited budget are the main obstacles in adopting a system based on digital analytics and marketing automation. Nevertheless, there is a high enthusiasm for the idea of DAMARWULAN, especially since this system not only targets promotion, but also increases the responsiveness of destinations to changes in environmental situations, such as extreme weather, surge in visitors, and sanitation issues.

In terms of visitors, observations and interviews show that younger tourists (aged 18–35 years) are very responsive to interactive digital content, real-time information, and easy access to tourism services. They stated that the presence of features such as digital maps, personalized activity recommendations, automated notifications, and AI-based testimonials greatly improved their experience when traveling to coastal areas such as Kenjeran Beach (Surabaya), Delegan Beach (Gresik), and Boom Beach (Banyuwangi).

In addition, observations of the destination's digital ecosystem show that most regional tourism promotion websites are not equipped with user behavior tracking systems (such as Google Analytics), have not integrated newsletter registration automation forms, and do not provide personalized interaction options. This shows the urgency of developing a system like DAMARWULAN that can consolidate automated analytics and communication functions in one web-based and mobile platform.

4.2. Quantitative Findings: Analysis of Traveller Respondent Data

The results of the distribution of the questionnaire to 300 tourist respondents show several important patterns related to their perceptions, experiences, and expectations of digital systems in marine tourism. From the descriptive analysis, it was found that 81% of respondents searched for destination information through social media and search engines, while only 27% accessed the official destination website. This shows the importance of optimizing informal digital channels and the need to increase the attractiveness and credibility of the destination's official website.

More than 73% of respondents stated that they would be more interested in revisiting a destination if they were given a good digital experience, such as content personalization, automatic reminders before departure, and interest-based promotional notifications. This shows that marketing automation is not only effective in attracting new visitors, but also in maintaining tourist loyalty.

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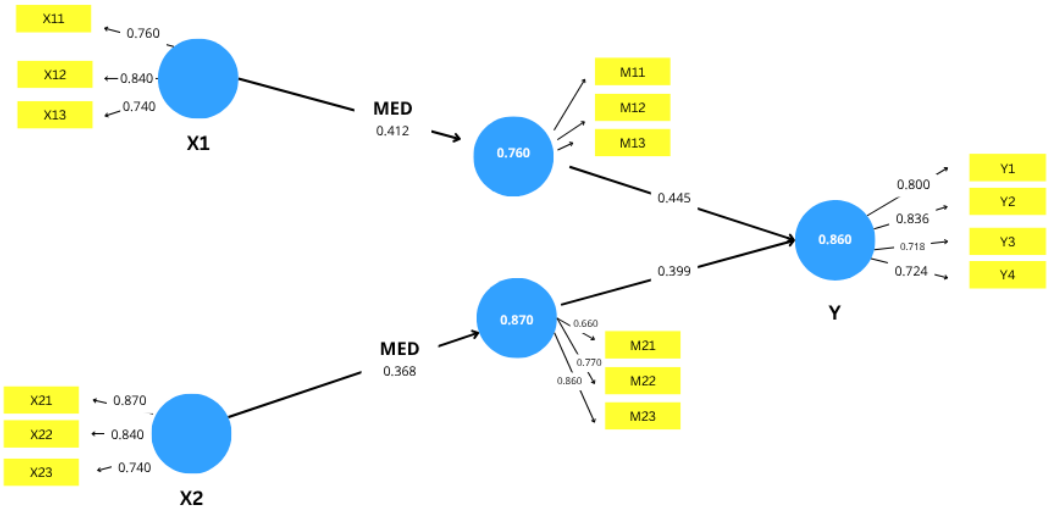

Figure 1.
Path Analysis.

4.2.1. Research Variables

Independent Variable (X):

X_1 Digital Analytics (DA)

Indicator:

1. Real-time traveller data usage
2. Visualization of traveler behavior and preferences
3. Data-driven decision-making system

X_2 Marketing Automation (MA)

Indicator:

1. Personalization of automated promotional campaigns
2. Scheduled email/SMS marketing
3. CRM integrated with social media

Mediation Variable (M):

M_1 Resilient Waterfront (RW)

Indicator:

1. Adaptation to climate change
2. Coastal risk information system
3. Sustainability of coastal ecosystems

M_2 Urban Leisure Advancement (ULA)

Indicator:

1. Diversification of technology-based attractions
2. Integration of local culture in urban tourism
3. Comfort and accessibility of urban tourism

Variable Dependency (Y):

Y Marine Tourism Performance (KWB)

Indicator:

1. Number of tourist visits
2. Length of stay and expenses of tourists

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3. Tourist satisfaction and loyalty
4. Coastal local economic growth

Based on the results of the model analysis in the chart, it can be concluded that this study uses *a structural equation modeling* (SEM) approach based on Partial Least Squares (PLS) to evaluate the relationship between variables in the framework of DAMARWULAN innovation. There are two main independent variables, namely $\mathbf{X}_1$ (Digital Analytics) and $\mathbf{X}_2$ (Marketing Automation), each of which is manifested by three latent indicators (X_{11}–X_{13} for X_1 (Digital Analytics) and X_{21}–X_{23} for X_2 (Marketing Automation)). These two variables affect two mediating variables, Resilient Waterfront and Urban Leisure Advancement, which ultimately have an impact on Marine Tourism Performance (Y).

4.2.2. Analysis of Variable Constructs X_1 and X_2

The X_1 variable shows a strong indicator loading value, with X_{11} at 0.760, X_{12} at 0.840, and X_{13} at 0.740. This shows that the indicators used to measure X1 (most likely representing *Digital Analytics*) are valid and reliable in explaining the construct. Similarly, the X_2 variable, which is assumed to be *Marketing Automation*, has an indicator of X_{21} with a load of 0.870, X22 of 0.840, and X23 of 0.740. This loading value shows a significant contribution of the indicator to the construct, reflecting the suitability of the measurement items to the conceptual dimensions of the construct.

4.2.3. Relationship of X1 and X2 to Mediation Variables (MED)

The Digital Analytics variable has an influence on the first mediation variable with a path coefficient of **0.412**. This means that there is a strong relationship between the application of *Digital Analytics* and the formation of mediation elements, which can be interpreted as *Resilient Waterfront*. This means that the application of digital analytics not only provides value on the marketing side but also contributes to the resilience of coastal tourism areas through predictive data and technology-based early response systems.

Meanwhile, Marketing Automation exerted an influence on the second mediation variable with a value of 0.368, which described *Urban Leisure Advancement*. This means that marketing automation can improve the urban tourism experience by providing personalization, convenience, and technology integration in destination services.

4.2.4. The Influence of Mediation Variables on Marine Tourism Performance (Y)

The two mediating variables each showed a positive relationship with the Y variable (destination performance). The first mediation, which came from Digital Analytics, contributed 0.445 to Marine Tourism Performance. This shows that the *resilience of waterfront areas* that are improved using *digital analytics* has a significant impact on destination performance, both in terms of visits, length of stay of tourists, and environmental sustainability.

Meanwhile, the second mediation from Marketing Automation produced a path coefficient value of 0.399 to variable Y. This shows that the increase in *urban leisure* through marketing automation systems also plays an important role in creating a better marine tourism experience, especially in the urban coastal areas of East Java which are undergoing urbanization and destination digitalization.

4.2.5. Validity of Mediation Constructs and Dependent Variables

The loading values for the mediation indicators (M_{11}–M_{13} and M_{21}–M_{23}) were all above 0.660, even up to 0.860, indicating that they were very good at explaining the mediation variables. Likewise, the dependent variable Y, which has an indicator loading value of Y1 to Y4 between 0.718 to 0.836. This indicates that all indicators used to measure the performance of marine tourism both in terms of tourist perception and destination operational data have a significant contribution to the main construct.

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The loading value of the variable Y of 0.860 also indicates that this model is quite robust and reliable in explaining the variants of destination performance. Thus, this approach empirically strengthens the argument that DAMARWULAN's innovation, through a combination of digital analytics and marketing automation, can encourage regional resilience and the progress of urban tourism which ultimately increases the competitiveness of marine tourism.

4.2.6. Theoretical and Practical Implications

These findings theoretically reinforce the literature that states that digital technology has an impact not only on marketing communication, but also on strategic and systemic aspects of the management of tourist destinations. Practically, local governments and tourism managers need to consider the wider application of the DAMARWULAN system as a data-driven platform that integrates marketing, coastal area risk mitigation, and urban tourism service innovation.

Overall, this model demonstrates the harmonious integration of information technology, ecotourism resilience, and the transformation of the tourist experience, especially in the context of the urban coastal of East Java which is the main object of this study. The combination of the power of digital analytics and marketing automation proves the potential to build a resilient and future-oriented marine tourism ecosystem.

In general, the DAMARWULAN model is positively received by tourists as an innovation that can increase comfort, satisfaction, and the desire to recommend destinations to others. This can be seen from the high Net Promoter Score (NPS) score of the group of respondents exposed to the DAMARWULAN prototype simulation (average score of 8.7 out of 10).

4.3. Integration of Qualitative and Quantitative Results

The integration of the two research approaches shows a strong convergence. The need for a responsive, adaptive, and automated digital system has been felt by both destination managers and tourists. Qualitatively, stakeholders understand the importance of digitalization but are often constrained by technical and resource limitations. Meanwhile, from the quantitative side, it is proven that the application of digital analytics and marketing automation has a positive correlation with satisfaction, loyalty, and perception of a modern and satisfying travel experience.

The results of this analysis also identified four key elements of the successful implementation of DAMARWULAN:

1. Technology Capacity: Availability of basic digital infrastructure such as Wi-Fi, sensor devices, dashboard analytics, and CRM platforms.
2. Human resource competencies: The ability of operators and tourism actors to understand, manage, and develop data-driven strategies.
3. Stakeholder Involvement: Collaboration between local governments, local communities, the private sector, and MSME actors greatly determines the success of an end-to-end digital system.
4. Digital Travel Experience Design: The integration of interactive features, digital storytelling, and ease of access to information also affects tourists' perception of the quality of destinations.

4.4. Implications for Improving Marine Tourism Performance

Based on all the findings above, the implementation of DAMARWULAN innovation has proven to have great potential in improving *the performance of* marine tourism destinations in East Java. Through this system, destinations can:

1. Optimize market segmentation through data analytics that can identify trends and behavior of travelers in real-time.
2. Strengthen communication and interaction through automated notification systems and campaigns that are timely, personalized, and relevant.

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3. Increasing competitiveness and adaptivity through environmental monitoring features, visitor capacity management, and data-based crisis handling.
4. Expand the impact of the local economy by directing tourist visits to local business actors based on a digital recommendation system.

The overall results of this study confirm that digital transformation is not just an option, but a strategic need in the management and development of coastal tourist destinations that are sustainable, competitive, and resilient in the face of changing times.

5. Discussion

The results of this study show that the integration of digital technology-based innovations, as reflected in the framework of DAMARWULAN, plays a strategic role in the transformation of urban marine tourism destinations into an adaptive, resilient, and experience-oriented entity for tourists. This discussion aims to critically elaborate the empirical findings obtained, relate them to relevant theories and literature, and highlight the conceptual and practical implications for the marketing practices of tourist destinations, especially in the context of the urban coastal areas of East Java.

5.1. Digital Transformation through Digital Analytics: From Insights to Tactical Strategy

One of the key findings of this study is the central role of *digital analytics* in shaping data-driven marketing strategies in the marine tourism sector. The use of analytics tools such as Google Analytics, Meta Insights, and Interactive Dashboards has opened new spaces for destination managers to understand visitor behavior patterns in real-time. These results are in line with the view of Smith and Chaffey [5] who asserts that *data-driven marketing* allows organizations to tailor content, time, and communication channels based on actual data, not assumptions.

On a practical level, destinations that can leverage data analytics can not only know where visitors are coming from, what their preferences are, and when they visit, but can also design a more personalized *customer journey*. In the context of East Java marine tourism, such as Banyuwangi Boom Beach or Kenjeran Beach Surabaya, this kind of information can be used to optimize event schedules, visitor distribution, and local promotional designs. This is where DAMARWULAN comes into play: the system is not only a tracking tool, but also a *decision support system* for destination managers and marketers.

However, a significant challenge revealed in the interview is the low digital literacy among local destination managers, especially those who still rely on traditional methods of promotion. Lack of training and digital infrastructure facilities are a barrier to this transformation. Therefore, a multi-layered approach is needed in the implementation of DAMARWULAN which includes digital education, the provision of open-source software, and the involvement of universities and technology actors in the mentoring process.

5.2. Marketing Automation and Travel Experience Personalization

Another finding that stands out is the effectiveness of *marketing automation* in increasing tourist loyalty and perception of destination professionalism. In the DAMARWULAN system, features such as *email automation*, *responsive chatbots*, visit reminders, and interest-based promo notifications have been proven to increase tourist engagement and influence revisit decisions.

A previous study by Kotler [2] confirms that personalization and proper communication timing significantly increase *conversion rates* in digital marketing. The findings of this study support that argument and add to the local context: domestic tourists in East Java and beyond show a positive response to polite communication, which is less invasive, and delivered through familiar channels such as WhatsApp Business, Instagram Direct Message, or e-mail.

However, the success of marketing automation is largely determined by *the quality of content* and *timing*. Automation that isn't supported by creative content, or is done too often, can lead to *digital*

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fatigue among users. Therefore, DAMARWULAN needs to be designed with a communication intensity setting algorithm that is adaptive to user behavior, including *unsubscribe features* and channel preferences.

5.3. Destination Resilience: Technology Integration and Environmental Adaptation

One of the critical aspects of the DAMARWULAN system is its focus on *resilient waterfront*, namely the ability of coastal tourist destinations to respond to environmental changes, social pressures, and economic uncertainty. The study identifies that destination resilience is not only influenced by physical factors (such as coastal infrastructure and disaster mitigation), but also by adaptive information systems, data-driven crisis management, and transparent and fast public communication.

The integration of the analytics system with environmental information such as weather data, wave status, and visitor density can help managers make quick decisions regarding the opening or closing of tourist areas, early warning, and redistribution of visitor flows. This is especially relevant in the context of Delegan Beach and Sewu Cemara Beach, which often face abrasion and overcapacity challenges during the holiday season.

From a theoretical perspective, this approach is rooted in the *socio-ecological resilience* framework, where tourism sustainability requires interaction between technology, people, and ecosystems (Folke et al., 2016). This research shows that digital technology can be an *enabler* in creating such harmony, if it does not ignore local social and cultural aspects. DAMARWULAN must be inclusive, not only serving the middle-to-upper class tourist segment but also accommodating the needs and access of local communities.

5.4. Urban Leisure Advancement: Redefining Marine Tourism as an Urban Experience

The next discussion highlighted how DAMARWULAN can change the perception of urban marine tourism from just a vacation activity to an integral part of the urban lifestyle. Tourism in urban coastal areas is now not only judged by its natural beauty, but also by how the place is integrated into the digital city ecosystem including the accessibility of online transportation, real-time digital information, online reservation systems, to Wi-Fi connectivity and social media.

Findings from younger travellers show that they expect "connected" experiences, where digital interaction becomes part of the narrative of their journey. The concept of *smart tourism* developed by Gretzel, et al. [6] is relevant in this regard. DAMARWULAN offers a framework where destinations become *smart leisure spaces* that are connected, responsive, and designed based on data.

The presence of digital storytelling, augmented reality (AR), and *gamification* is also an innovative opportunity in the development of urban leisure. For example, the search feature for maritime history traces of the city of Surabaya through the AR application, or ecotourism-themed digital challenges integrated with the DAMARWULAN platform, can encourage simultaneous tourist engagement and education. This is an effort to bridge the commercial and educational value of coastal destinations.

5.5. Stakeholder Dynamics and Implementation Challenges

Although the results of the study show the great potential of the DAMARWULAN system, there are important challenges that arise in cross-stakeholder discussions. First, there is a *digital readiness gap* between local governments, tourism actors, and local communities. Some areas such as Banyuwangi have shown higher readiness because they have adopted the *smart city* principle earlier, while other areas such as Gresik are still dependent on conventional promotion models.

Second, there are concerns about the privatization of tourist data and the potential for unethical commercial exploitation. Therefore, the DAMARWULAN system must be built with a strong data ethics framework, including the principles of transparency, consent, and privacy protection.

Third, financial sustainability is needed. Digital systems like DAMARWULAN require a large initial investment and long-term maintenance support. Therefore, cross-sector collaboration (public-private partnership) is very important. The government can act as facilitators and regulators, while the private sector and academia can be partners in innovation.

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5.6. Theoretical and Practical Implications

Theoretically, this research enriches the discourse of technology-based destination marketing by synergizing digital analytics, marketing automation, and resilience approaches in one integrated model. DAMARWULAN offers a hybrid framework between the theory of *smart tourism*, *resilient destination management*, and *digital customer experience*, which can be used as a reference for further studies in other coastal areas.

Practically, DAMARWULAN functions as a prototype model of a digital system that can be adopted and adjusted by local governments and destination managers. Considering the results of the study, the authors recommend that this system be tested on a limited basis through pilot projects in two or three leading destinations, before being widely replicated. This phased approach allows for adjustments to the local context and continuous evaluation of the effectiveness of the system.

6. Conclusion

This research aims to explore and develop the innovation of the DAMARWULAN system as an integrative approach based on digital technology in improving the performance of marine tourism destinations in the urban coastal areas of East Java. By combining *digital analytics*, *marketing automation*, *resilient waterfront management*, and *urban leisure development*, this study shows that digital transformation can strengthen the competitiveness and sustainability of marine destinations amid the dynamics of tourist behavior, environmental challenges, and post-pandemic economic pressures.

The results of the study revealed that the application of digital analytics is able to provide in-depth insights into tourist behavior, communication channel preferences, and the effectiveness of promotional campaigns. Meanwhile, marketing automation plays a significant role in building personalized, efficient, and sustainable traveler engagement. In the context of resilient waterfront, DAMARWULAN's system can support data-driven risk management, optimize travel experiences, and quickly adapt services to changing environmental conditions.

DAMARWULAN also plays a role in redefining the marine tourism experience from just natural tourism to being part of a smart *urban lifestyle*. These findings support the idea that coastal tourism is not only about the use of natural beauty, but also how destinations are digitally and socially curated to provide sustainable added value for tourists and local communities.

With a mixed-method approach, this study has succeeded in mapping the needs for destination digitalization, implementation challenges, and the potential for multi-stakeholder collaboration in the development of technology-based marine tourism ecosystems in East Java. DAMARWULAN's innovation is expected to be a model for strengthening the marketing strategy of marine tourism destinations that are adaptive, inclusive, and sustainable.

6.1. Research Limitations

This research has several limitations that need to be acknowledged. First, the geographical scope of the research is still limited to several urban marine tourism destinations in East Java such as Surabaya, Banyuwangi, and Gresik. This makes the generalization of results not yet able to cover all characteristics of Indonesian marine tourism, especially in more remote areas or not yet digitally developed.

Second, the implementation of the DAMARWULAN system in this study is still at the conceptual stage and limited simulation. There have been no long-term trials on a real scale that can assess the operational and financial impact of the system over a longer period.

Third, limitations in obtaining more detailed secondary data from government agencies and the private sector reduce the depth of analysis on policy aspects and technology investment. In addition, the involvement of local tourism actors in some interviews was also limited by limited time and readiness of respondents.

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Therefore, the results and conclusions in this study should be interpreted with the limited context and scope of the research and serve as a starting basis for the development of more comprehensive follow-up research.

6.2. Recommendations for Advanced Research

To support the further development of the DAMARWULAN system, there are several recommendations for further research that can be carried out. First, it is necessary to test the implementation of the DAMARWULAN system in the form of *a pilot project* in certain urban marine tourism destinations, for example in the Banyuwangi Boom Beach or Kenjeran Beach area, to evaluate the effectiveness and efficiency of the system on a real scale, including its impact on tourist satisfaction and an increase in the number of visits.

Second, advanced research can develop experimental quantitative approaches to measure the direct influence of marketing automation and digital analytics on traveler behavior, such as *booking intent*, *loyalty*, and *word-of-mouth*. Integration with the theory of digital consumer behavior will strengthen the theoretical foundation of this system.

Third, collaborative research across fields (e.g. with computer science, urban planning, and the environment) is needed to develop DAMARWULAN modules based on the Internet of Things (IoT) and artificial intelligence (AI) to support system responsiveness to environmental conditions and real-time visit capacity management.

Finally, important recommendations are also given for local governments to support this kind of applied research through financing, policy integration, and sustainable public-private partnerships.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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