



## Analysis and Design of Regional Tourism Information System “SIPARDA” of Morotai Island Regency

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### Abstract

The analysis and design of the regional tourism information system known as SIPARDA is a follow-up to the results of the strategic planning of the information system to optimize the performance of the bureaucracy, especially the Tourism Office of Morotai Island Regency, related to the main tasks and functions of the destination and tourism industry, tourism marketing, and creative economy. SIPARDA's design was carried out using the concept of a Software Development Life Cycle (SDLC) through a waterfall approach. The application design method begins with identifying user needs and designing a tourism information system relevant to the main tasks and functions of the Tourism Office in the Morotai Island Regency. Unified Modeling Language (UML) is used to describe the business processes of SIPARDA. Five primary actors can operationalize the system: the head of the tourism officer, the tourism industry and destination department, the tourism marketing department, the creative economy department, and the administrator. Thus, each department can document attractions, amenities, accessibility, and accommodation data in the Morotai Island Regency as a regional tourism development decision-making database.

**Keywords:** SIPARDA, SDLC, Waterfall, Tourism, Morotai

### 1. INTRODUCTION

Tourists can utilize tourism information systems to meet information needs by using digital platforms. [1] designed a website-based tourism information system to make it easier for people to access information on tourist destinations without the limitations of space and time. In addition, [2] shows that the tourism information system is not limited to information but also the function of processing data according to the needs of system users. On the other hand, [3] shows that tourism information systems are very diverse. Several methods were developed to support the decision-making process and produce travel



recommendations. In the Indonesian context, tourism information systems are still predominantly used as a destination marketing strategy [4]. Thus, the website-based tourism information system is informative and responsive to user needs and system innovations in line with the increasing preferences of tourists as system users.

Tourism is holistic and needs to be studied from various perspectives. This encourages information technology innovation to promote the performance of multiple organizations and business entities in the tourism sector to facilitate the decision-making process, destination marketing, and travel recommendations. [5] designed a tourism information system using the Rapid Application Development (RAD) approach to provide information about tourism through a website application. [6] created a website-based tourism information system using an object-oriented approach and adopted black box testing for application testing by minimizing data structure errors or database access, interface errors, initialization and termination errors, and improper or hiring functions. This shows that the purpose of system design must be balanced with a system design approach that is by the needs of users and system development frameworks.

The study of tourism information systems in the Morotai Island Regency is still dominated by the design of informative websites that conventionally display information on tourism potential and information maps of tourism potential [7]. Meanwhile, technology has developed to enable the innovation of a more holistic tourism information system based on the characteristics of the tourist destinations to be managed, such as studies on the mangrove ecotourism management information system on Morotai Island [8], [9], as well as reflections on geographic information systems that can be used to optimize mangrove ecotourism management on Morotai Island [10]–[13]. The development of innovative research on optimizing Morotai tourism management using information technology can accelerate economic-tourism growth that is responsible for improving local communities' environmental and socio-cultural quality. Therefore, an innovative study of relevant and contextual tourism information systems is needed to optimize tourism resources according to existing human resource quality on Morotai Island.

The bureaucracy of the Tourism Office on Morotai Island requires the support of digital applications for the data inventory process to program management by the vision and mission of the Regent and Deputy Regent [14]. The Morotai Island Tourism Office is one of the bureaucratic parts that play an essential role in achieving the vision and mission of the Morotai island development through an integrated work program [15]. Previous studies' recommendations for tourism information systems are still limited to designing strategic information systems [16] and creating GIS-based tourism website applications only used by tourists [16]. Based on the limitations of previous research, SIPARDA's research initiation seeks

to accommodate the main tasks and bureaucratic functions of each field in the Morotai Island Tourism Office in an integrated system.

The Regional Tourism Information System, SIPARDA, is specifically designed to optimize the performance of tourism agencies. Nevertheless, it does not rule out the possibility of being used by the public as data and information in setting tourist travel destinations in the Morotai Island Regency. The SIPARDA application needs to be developed thoughtfully considering the economic potential of Morotai tourism [17] and the development of tourism infrastructure every year [18]. SIPARDA can be used as a reference for the formulation of policies and programs for the development of tourist destinations, the development of the tourism industry, the development of the creative economy, to the determination of marketing strategies. In addition, data and information in SIPARDA can be used to evaluate and measure the success or achievement of the program by the goals set in Regional Tourism Development Master Plan known as Rencana Induk Pengembangan Pariwisata Daerah (RIPPDA) and Tourist Attraction Development Master Plan known as Rencana Induk Pengembangan Objek Wisata (RIPOW).

## 2. METHODS

The method of designing the information system used is the Software Development Life Cycle (SDLC) with a waterfall model. [19] shows that SDLC is a framework that can be adapted to the waterfall model, which comprises five phases to complete sequentially to develop software. In addition, [20] shows that SDLC is one of the frameworks with the most effective flow of information system design when juxtaposed with AGILE and Traditional Approaches. This indicates that SDLC has advantages in designing information systems that can be integrated with various application development models, such as waterfalls. Thus, the Sparda application design will adopt the SDLC framework with a waterfall model.

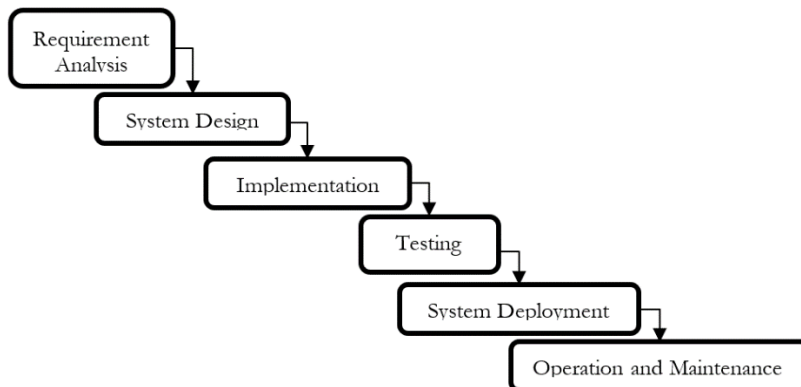


Figure 1. SDLC and Waterfall Model

Figure 1 is a stage needed in the design of SIPARDA. At the requirement analysis stage, the initiation of the information system is analyzed in depth using tourism perceptions, namely the Tourism Area Life Cycle and irritation index, to identify opportunities and challenges that arise with hypotheses before and after this system is designed. Furthermore, an analysis of the Value Chain, Porter's five forces, Strength, Weakness, Opportunities, Threats (SWOT), and McFarlan Grid Strategic was used to comprehensively examine SIPARDA's contribution to the performance of the Tourism Office in Morotai Island District. Based on the results of the requirement analysis, it was found that the number of actors that need to be accommodated in SIPARDA, namely the head of the Tourism office, the leader of the destination and tourism industry, the head of tourism marketing, and the head of the creative economy sector, as shown in the following table.

**Table 1.** Requirement analysis for Primary Actor and Authentication

Primary Actor	Authentication
Head of Tourism Office.	<ul style="list-style-type: none"> <li>• Access all information related to tourism destinations</li> <li>• Access all information related to the tourism industries</li> <li>• Access all information related to tourism destination marketing</li> <li>• Access all information related to the creative economy</li> <li>• Access all information related to policies and programs</li> </ul>
Destination and Tourism Industry Dept.	<ul style="list-style-type: none"> <li>• View, Insert, Update, Select, and Delete the tourism destination data based on location and Classification.</li> <li>• View, Insert, Update, Select, and Delete the tourism destination program based on location and fiscal year</li> <li>• View, Insert, Update, Select, and Delete the policy for tourism destination development based on location and fiscal year</li> <li>• View, Insert, Update, Select, and Delete the tourism industry data based on location and Classification.</li> <li>• View, Insert, Update, Select, and Delete the tourism industry development program based on location and fiscal year</li> <li>• View, Insert, Update, Select, and Delete the policy for tourism industry development based on location and fiscal year</li> </ul>
Tourism Marketing Dept.	<ul style="list-style-type: none"> <li>• View, Insert, Update, Select, and Delete the policy for tourism marketing based on the destination, location, classification, and fiscal year</li> <li>• View, Insert, Update, Select, and Delete the programs for tourism marketing based on the destination, location, classification, and fiscal year</li> </ul>
Creative Economy Dept.	<ul style="list-style-type: none"> <li>• View, Insert, Update, Select, and Delete the policy for creative economy development based on the destination, location, classification, and fiscal year</li> <li>• View, Insert, Update, Select, and Delete the programs for creative economy development based on the destination, location, classification, and fiscal year</li> </ul>
Administrator	<ul style="list-style-type: none"> <li>• View, Create, Update, Select, Deactivate, or Delete the user based on user profile (name, employee_id, department_dept, username, and password)</li> <li>• View, Create, Input, Select, Update, and Delete all the data in the Destination and Tourism Industry Department.</li> <li>• View, Create, Input, Select, Update, and Delete all the data in Tourism Marketing Department.</li> <li>• View, Create, Input, Select, Update, and Delete all the data in the Creative Economy Department.</li> </ul>

Table 1 is the result of identifying user needs to be adjusted to the user's access rights in SIPARDA system functions such as creating, inserting, selecting,

updating, deactivating, or deleting data. Based on the results of identifying user needs, especially system users within the scope of the Morotai Island Regency Tourism Office, it can be seen that the Head of the Office needs to get access to all information related to destinations and the tourism industry, tourism marketing, and the creative economy. Meanwhile, each department is responsible for completing all the data needed for each field's main tasks and functions in the tourism office. Meanwhile, administrators must monitor user activities utilizing the SIPARDA system, including system security from irresponsible individuals.

At the system design stage, the SIPARDA Interface is designed by the primary domain of the Morotai Island Regency local government website, namely <https://pulaumorotai.kab.go.id/> as the leading portal that will be directed directly to the login page to access the homepage of the SIPARDA website. Thus, administrators who play an essential role in monitoring SIPARDA activities can be operationalized by the IT support field in the Morotai Island Regency Government. SIPARDA synergy with other information systems in government is needed to optimize the performance of the tourism office and facilitate the process of program control by leaders in each field of government. Meanwhile, the SIPARDA interface design uses several applications, namely Figma and Star UML applications, to describe use cases and activity diagrams of the unified modeling language (UML) structure.

Meanwhile, at the implementation, system testing, and maintenance stages of SIPARDA. The framework used in the process of realizing the results of the design is Laravel 9 with an object-oriented programming approach. Meanwhile, the system testing stage refers to the effects of system user reviews. The criteria in the PIECES framework are performance, information and data, economics, control and security, efficiency, and services. The maintenance stage is carried out to adjust the processing time and the recommended changes to optimize the performance of each department according to user needs from time to time. Thus, SIPARDA can be used by each department to optimize the regional tourism development process in Morotai Island Regency.

### 3. RESULTS AND DISCUSSION

SIPARDA is designed according to users' needs of the system and the bureaucratic structure of the tourism office of the Morotai Island regency, North Maluku province, Indonesia. In addition, the Regional Tourism Development Master Plan (RIPPDA) and the Tourist Attraction Development Master Plan (RIPOW) are used as references for the classification process of tourist destinations, tourism industry, tourism marketing, and creative economy by the availability of resources in Morotai island regency, as the use case of SIPARDA below.

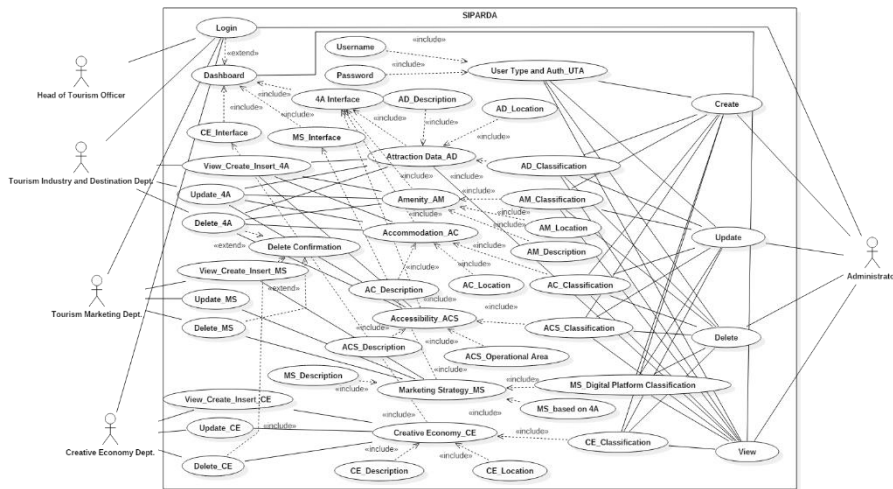
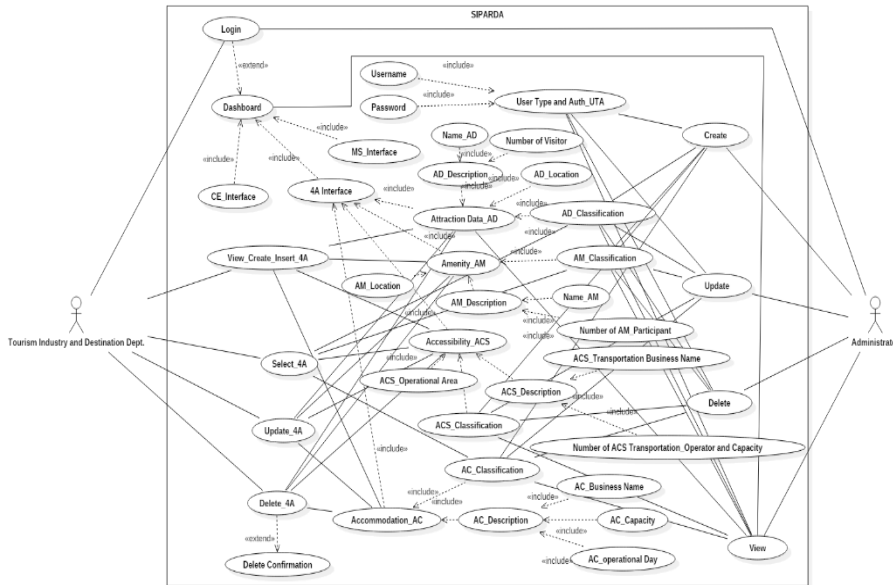


Figure 2. Use Case of SIPARDA

Figure 2 shows that SIPARDA was designed as a platform to store a database of regional tourism-related Attractions, Amenities, Accessibility, and Accommodation (4A). When connected with the primary duties and functions of each field in the Morotai Tourism Office, it can be seen that the Tourism Industry and Destination Department, Tourism Marketing Department, and Creative Economy Department have the responsibility to carry out data collection on the availability of tourism resources on Morotai Island by utilizing the Create, Update and Delete function on SIPARDA so that it can be visualized in an integrated manner and accessed by the Head of the District Tourism Office Morotai Island. The parties taking advantage of SIPARDA are limited to the head of the Tourism Office and the authority of each department in the tourism office. The administrator must create an account based on the User Type and Authentication, including the Username and Password, then submit it to the Head of the tourism department and the Head of each department to access their respective homepages. The administrator is also responsible for creating a database for the classification of 4A, Marketing Strategy (MS), and Creative Economy (CE) so it can be displayed as a radio button.

Each department can take advantage of SIPARDA's View, Create, Insert, Select, Update and Delete functions to view data, create or add data, input and select, update, and delete data. Based on the SIPARDA use case, not all new data is inputted by each field in the Morotai Island Tourism Office. Several data have explicitly been stored in the database by the administrator, such as the classification of attractions (AD\_Classification), amenity (AM\_Classification), Accommodation (AC\_Classification), accessibility (ACS\_Classification), and creative economy (CE\_Classification). Thus, each department quickly chooses the

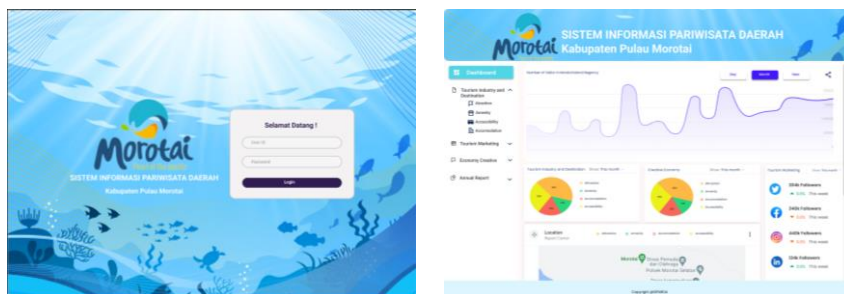
correct classification according to the inputted data. SIPARDA accommodates the interests of each department to enrich valuable information for decision-making, as in the following use cases of the Tourism Industry and Destination Department.



**Figure 3.** Use Case of Tourism Industry and Destination Department in SIPARDA

Figure 3 shows that the Tourism industry and destination department can view, create, insert, select, update and delete attraction data, amenities, accessibility, and accommodations. In the context of attraction data, several descriptions are essential to identify, namely the name of the attraction (Name\_AD) and the number of visitors (Number of Visitors); in addition, there is data on the location of interests that need to be completed and classification (AD\_Classification) that can be selected according to the criteria of attractions, both cultural tourist attractions, marine tourism, historical tourism, and artificial tourism. In the context of amenity data, important descriptions need to be included in the system, namely the name of the amenity (Name\_AM) and the number of participants as amenity managers (Number of AM\_Participant). Meanwhile, location (AM\_Location) and amenity classification (AM\_Classification) are needed to identify the diversity of amenities in a tourist destination as a counterweight to attractions.





**Figure 4.** Interface Design of login form and main dashboard of SIPARDA

Figure 4 shows a landing page design from the SIPARDA login form and main dashboard. The main page design on the SIPARDA website displays detailed information about the number of attractions, amenities, accessibility, and accommodation in the Morotai Island Regency based on the primary duties and functions of each field in the local Tourism Office. In addition, there is a map feature that indicates the location of the attractions, amenities, accommodations, and accessibility. In the context of accessibility data, the description of the intended data is not limited to the distance and travel time from the city center to various tourist destinations but rather modes of transportation and private business in the field of transportation. Therefore, the accessibility description emphasizes the name of the local transportation business entity (ACS\_Transportation Business Name), the number of operators, and the transportation mode's capacity (Number of ACS Transportation\_Operator and Capacity).

In addition, the transportation operational area (ACS\_Operational Area) can also be selected based on the classification of sea and land transportation modes (ACS\_Classification). In the context of accommodation data, the description that needs to be completed is the name of the accommodation business (AC\_Business Name), accommodation capacity (AC\_Capacity), and working day (AC\_Operational Day). Meanwhile, the location of accommodation (AC\_Location and accommodation classification (AC\_Classification) can be selected based on types such as homestays, resorts, cottages, and hotels according to the operational area. Thus, data on amenities, attractions, accessibility, and accommodation (4A) as support for tourism activities in the Morotai Island Regency area become integrated and can be visualized digitally through SIPARDA. Unlike the case with the use case tourism marketing department, as shown in figure 5 below.



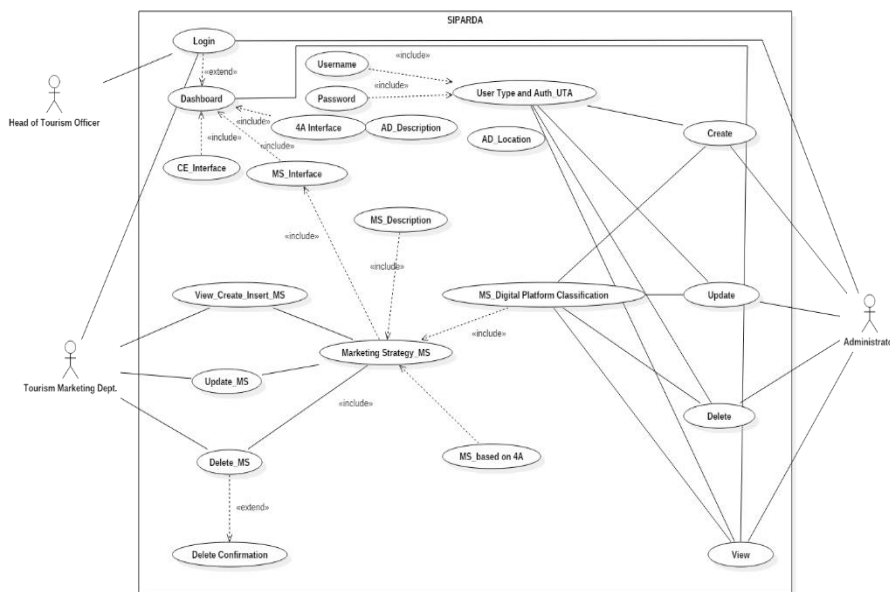
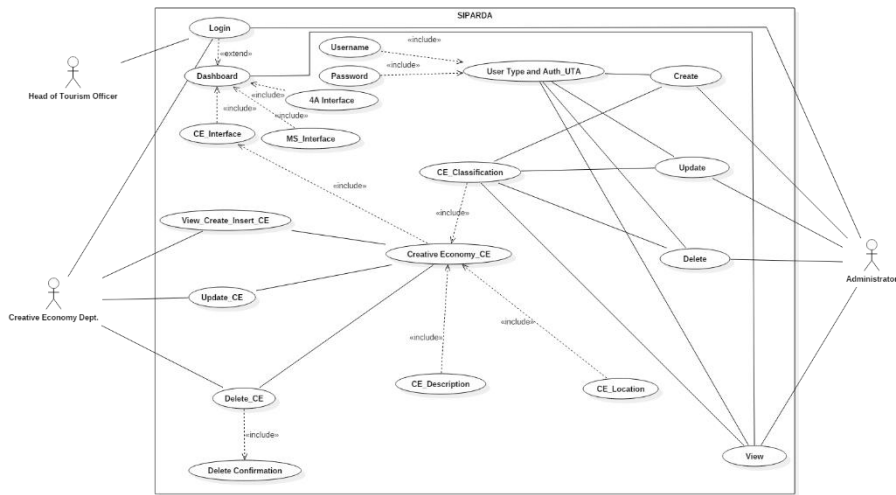


Figure 5. Use Case of Tourism Marketing Department in SIPARDA

Figure 4 shows that the operator of the tourism marketing department must first be logged in to the website to be able to perform functions such as view, create, and insert features and marketing strategies to be applied based on the existing conditions of 4A (Attraction, Amenities, Accessibility, and Accommodation). In addition, the tourism marketing department can use the marketing strategy data update feature if needed and delete marketing strategy data if it is considered irrelevant to existing conditions. On the marketing strategy page (Marketing Strategy\_MS), there is a description (MS\_Description) related to 4A (Attractions, Amenities, Accessibility, and Accommodations). Furthermore, administrators can create, update, delete, and view functions from the characteristics of the digital marketing platform used for tourism marketing (MS\_Digital Platform Classification). Thus, each of the 4A elements has a different marketing strategy relevant to the existing conditions (MS\_Based on 4A). All information that the field of tourism marketing inputs will appear on the CE\_Interface and can be accessed by the head of the tourism office. In addition, the area of the creative economy also has different functions, as shown in figure 6 below.



**Figure 6.** Use Case of Creative Economy Department in SIPARDA

Figure 6 indicates that the operator of the creative economy field must first log in to view, create, and insert creative economy data into SIPARDA. In addition, data can be updated by policies in the creative economy or tourism offices by considering existing conditions. In addition, the creative economy field can also delete data if it is no longer relevant. The website page (Creative Economy\_CE) for the area of the creative economy provides data related to the description of the creative economy (CE\_Description), location (CE\_Location), as well as the appropriate classification (CE\_Classification). Meanwhile, the administrator has a function to create, update, delete, and view creative economy classification data (CE\_Classification) so that it can be accessed in the field of the creative economy in the form of a button radio.

The SIPARDA design refers to the results of the value chain analysis, namely primary activities and supporting activities of the Morotai Island Regency Tourism Office. SIPARDA is designed to be used institutionally to achieve the objectives of tourism development programs that are integrated with the vision and mission of regional leaders in developing policies and strategies effectively and efficiently. In addition, SIPARDA is also adapted to the bureaucratic context of the Morotai Island Regency Tourism Office, which is structurally divided into three areas with their respective main tasks and functions. The Tourism Destination and Industry Department is responsible for formulating policies, planning, and monitoring programs for tourism destinations and the tourism industry. Meanwhile, the Tourism Marketing Department is tasked with identifying the number of visits to the destination and the length of stay of tourists in the destination area. Meanwhile, the Creative Economy Department is tasked with identifying, documenting, and analyzing public participation and investment in the creative economy sector. This

shows that all three play an important role in data inventory as a reference for formulating appropriate development policies and programs. Thus, the SIPARDA value chain of the Morotai Island Regency can be described as follows.

Primary Activity	Tourism Policy, Planning, Implementation and Monitoring of Development Programs		
	<b>Tourism Destination and Industry</b>	<b>Tourism Marketing</b>	<b>Creative Economy</b>
	<ul style="list-style-type: none"> <li>• Tourism Policy, Planning, and Monitoring the Development of Destination</li> <li>• Tourism Industry Policy, Planning, and Monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>• Number of Tourist visiting destination</li> <li>• Length of stay in each destination</li> </ul>	Participation and Investment of Creative Economy Industry
Support Activity	<ul style="list-style-type: none"> <li>• Tourism Policy Formulation through Regional Tourism Development Planning and Policy known as <i>Rencana Induk Pembangunan Pariwisata Daerah (RIPPPDA)</i>.</li> <li>• Implementation and Monitoring of Tourism Events and Development Programs based on Destination Development Programs known as <i>Rencana Induk Pengembangan Objek Wisata (RIPOW)</i>.</li> <li>• Provide information about the number of Tourism Destination (Annually).</li> <li>• Provide information or database of the Tourism Industry and regional income of the tourism sector.</li> <li>• Provide information about the number of tourists in each destination.</li> <li>• Provide information about duration/length of stay based on accommodation of each destination.</li> <li>• Provide information about the number of participants in the creative economy.</li> </ul>		

Figure 7. Value Chain Analysis of SIPARDA

Figure 7 depicts the SIPARDA value chain as a digital application that supports secondary activities from all three fields in the Tourism Office of Morotai Island Regency. Thus, it can be known that SIPARDA supports the policy formulation process in *the Regional Tourism Development Master Plan (RIPPPDA)* and *the Tourism Object Development Master Plan (RIPOW)*. In addition, SIPARDA provides a variety of information related to the development of the number of tourist destinations, the tourism industry, regional income from the tourism sector, the number of visitors, the length of stay based on the characteristics of accommodation in tourist areas, as well as participation and investment in the field of the creative economy. The data stored in the SIPARDA database is beneficial for stakeholder considerations in decision-making and setting priority programs. Several previous studies have shown that digital applications can be used as a data storage medium to monitor the dynamics and challenges of tourism development in each region [21].

On the other hand, digital applications supporting tourist activities are needed by smartphone users as a reference for tourist trips [22]. This shows that the tourism information system developed in each region cannot be generalized due to contextual resource and infrastructure characteristics. Thus, the tourism information system is tailored to the needs of tourist destination management agencies, government agencies, especially tourism agencies, and the parts of tourists who use the application. Considering this, SIPARDA is limitedly designed

for the internal interests of the bureaucratic management of the tourism department in the context of the Morotai Island District. Nonetheless, SIPARDA was designed with Porter's five forces in mind to identify opportunities for improved agency performance before and after using SIPARDA, as shown in Table 2 below.

**Table 2.** Modification of Porter’s five forces due to Tourism Information System Analysis

Porter's Five Forces Factors in Tourism Information System	Balance Power of SIPARDA
Rivalry among Destination Management Organizations	Each local government has developed an integrated and digital bureaucratic system. SIPARDA offers features, functions, and databases by the 4A concept and to the needs of the Tourism Office in integrating policy directions, strategies, and development programs in each destination for annual evaluation.
The threat of New Entrants (New Tourism Destinations)	Each village government can use SIPARDA to input data on tourist attractions to show the uniqueness and diversity of tourism potential that has competitiveness with other tourist destinations that have been known before.
The threat of Substitute Attraction in Tourism Destination	SIPARDA provides a feature to accommodate information related to attraction, accommodation, amenities, and accessibility through an aesthetically pleasing and easy-to-understand interface for beginners.
Bargaining power of User preference based on application usability	SIPARDA is flexible in changing features and functions to adapt to the trend/popularity of tourists' preferences and needs.
Bargaining power of Tourism Stakeholders	SIPARDA has the advantage of providing user-generated sub-operators for other stakeholders to add data according to each sector's scope of activities and responsibilities based on the 4A classification to enrich the attraction data in the destination.

Table 2 is the result of porter's five forces due to Tourism Information System Analysis identification, and analysis shows the balance power of SIPARDA. The SIPARDA application has several advantages in data inventory by the main tasks and functions of each field which can be used as a benchmark for sectoral performance evaluation based on program achievements every year. Suppose SIPARDA is the primary main application for program evaluation and performance. In that case, siparda's competitiveness is even higher. In contrast, SIPARDA is only used by the tourism department of Morotai Island Regency for the availability of local resources and tourism infrastructure that has been developed previously.

Meanwhile, the threat of developing a website application resembling SIPARDA is not a threat of imitation because the Morotai Island Regency Tourism Office can internally operationalize SIPARDA. The operator can only grant access rights after a strict administrative or bureaucratic process to anticipate the misuse of data

and information. Furthermore, SIPARDA is designed to be flexible to use and easy to understand, especially if the Morotai Island District Tourism Office wants the participation of the village government as part of the sub-operator under the control of each department. Thus, the data input process can be carried out using a participatory approach involving various stakeholders in the tourism sector of Morotai Island.

#### 4. CONCLUSION

Based on the results of this study, it can be seen that the regional tourism information system known as SIPARDA can support the performance of the Morotai Island Regency Tourism Office in documenting attractions, amenities, accommodation, and accessibility data digitally using a website-based application that is integrated with the destination and tourism industry, tourism marketing, and the creative economy field. This shows that SIPARDA is one of the alternative solutions for efforts to improve the performance of the Morotai Island Regency Tourism Office. Thus, decision-making and formulation of priority program directions and policies can be carried out based on data and information that has been collected periodically. Some of the advantages of SIPARDA are as follows: Each local government has developed an integrated and digital bureaucratic system. SIPARDA offers features, functions, and databases by the 4A concept and to the needs of the Tourism Office in integrating policy directions, strategies, and development programs in each destination for annual evaluation; Each village government can use SIPARDA to input data on tourist attractions to show the uniqueness and diversity of tourism potential that has competitiveness with other tourist destinations that have been known before; SIPARDA provides a feature to accommodate information related to attraction, accommodation, amenity, and accessibility through an aesthetically pleasing and easy-to-understand interface for beginners; SIPARDA is flexible to change features and functions to adapt to the trend/popularity of tourists' preferences and needs; SIPARDA has the advantage of providing user-generated sub-operators for other stakeholders to add data according to each sector's scope of activities and responsibilities based on the 4A classification to enrich the attraction data in the destination. Thus, it can be known that SIPARDA is very effectively used to improve the performance of the tourism office in the Morotai Island District.

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