Information Systems for Semeru Mountain with QR Code and RFID Technology

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Abstract: The natural beauty of Indonesia undoubtedly received great attention from foreign tourists. Provides fascinating views of the ocean, mountains, and plains make Indonesian tourism sectoral contributed US $ 10.69 billion or equivalent to Rp136 trillion, through its foreign exchange. That makes tourism sector the mainstay of national income. One of attractive Indonesian tourism sector is mountaineering. Not only climbed by local tourists, mountains of Indonesia attract foreign tourists to subdue. This leads to the need for more attention to the comfort and safety of climber during the ascent of mountains in Indonesia. So its become the need to design a system that is more integrated with technology utilizing the QR Code, Operational Information Systems (OIS), and Radio Frequency Identification (RFID), to potentially reduce the number of accidents while climbing. This research proposes system design starting from registration to operational control. The results of the study are proposing a system for integrating due to mountaineering activity from registration to climb operational control. In addition this reasearch find that, when there is a mismatch on the climbing trip there will be a Search and Rescue (SAR) operation.

1 INTRODUCTION

The beauty of Indonesia's nature has undoubtedly gained great attention from foreign tourists. Providing beautiful views of the sea, mountains and terrain makes the Indonesian tourism sector able to contribute US $ 10.69 billion or equivalent to Rp136 trillion through its foreign exchange. This makes the tourism sector a mainstay of state income.

Mountain hiking is one of the interesting tourism sectors in Indonesia. Not only hiked by local tourists, but the mountains of Indonesia attract foreign tourists to conquer it. This led to the need for more attention to comfort and safety during mountain hiking in Indonesia.

Referring to the description, the problem formulation in this research is 1) how the information system of Mount Semeru ascent which is integrated by using QR Code and RFID technology. The purpose of this research is to produce the integrated information system design starting from the reservation, payment, and supervision of Mount Semeru hiking activities, as an effort for a safe hike, preventing the visitors to get lost and create a structured tourism.

2 RESEARCH METHOD

The research approach used in this study is a qualitative approach by taking the benefits and cost of the proposed flowchart into account.

3 RESULTS AND DISCUSSION

3.1 Reservation Process for The Mount Semeru Hiking Visitors

There are two processes, namely the registration process for the Mount Semeru hiking visitors and the operational process of searching for lost visitors. Based on the exposure of the Head and the Registration clerk of Resort Ranu Pane, visitors can choose the ascent path online or offline then complement the data and terms, and settle the payment. After that, come to the counter leaving their identity cards as an insurance and receive briefings from the officers, and the hike begins.

3.2 Operational Process of Searching for Lost Visitors

The operational process of searching for lost visitors starts with the visitor reporting to the clerk. Then the advanced team will go to the location to start the search. When the search is done, the news will spread and the area will be closed. Searches are done together until the visitor is found/not found or until the visitor status is clear.
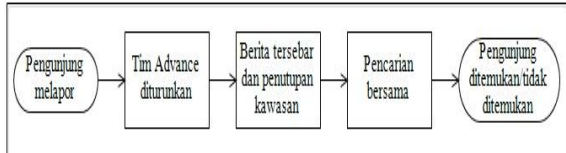
3.3 System's Superiority

- The detailed rules and requirements are available on the web, making it easier for potential visitors to do the preparation earlier;
- Booking can be done in advance making it advantageous for the visitors to not run out of quota;
- The payment system that already utilizes the bank's cash transfer system, so no one needs to carry excess money when doing the hike;
- There is a briefing about SOP that adds visitor's insight about hiking;
- When the detailed check of the proof of payment has been done, the date of the hike as well, if they do not meet the condition they have to buy additional tickets;
- Real time report on the number of the visitors to the big hall;
- They don't keep the cash from the ticket admission process for too long;

- The search system for lost people has advanced teams trained for early action.

3.4 System's Weakness

- The total quota of 500 people per day can not be viewed entirely on the web, because on the web only presents the online registration quota information, so when visitors come directly to the registration post there are no information about the availability of quota. The quota on the web is also often less updated with how it looks;
- When payment has been made visitors still have to make their own confirmation and is not automatically confirmed;
- There is still a lot of paper use in the registration system;
- The absence of an integrated database of the resort managers with the large hall, so they have to do a manual report every day;
- The absence of an adequate surveillance system, relying solely on the initial guard at the entrance gate, and from the precision of taking the identity cards. The search for lost visitors also usually starts from a visitor's friends report;
- Announcement to close up the hike is quite not fast, that makes some visitors got rejected to hike because they themselves lack of information about the closing of the hike.

3.5 Mount Semeru Ascent Integrated Operational Information System Proposal
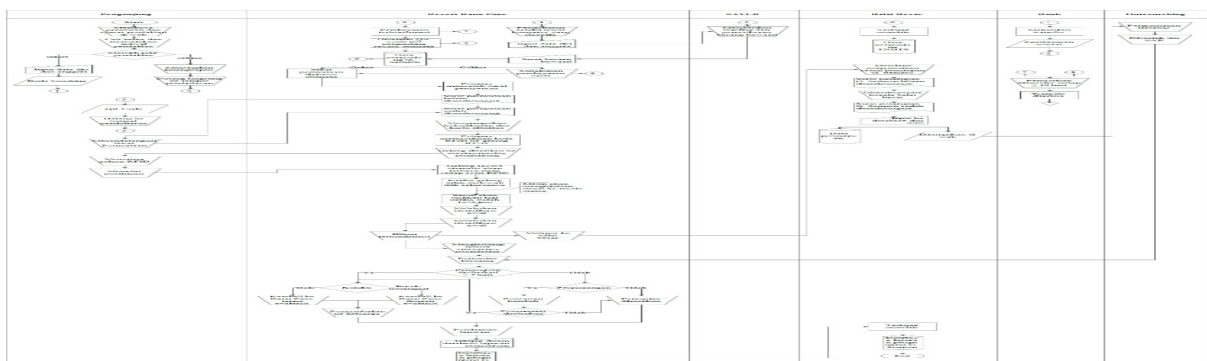
3.5.1 Flowchart Proposal

Figure 1: Flowchart Proposal.

Source: Processed data, 2016.

3.5.2 QR Code

QR Code is used to facilitate the detection of direct visitors, so that visitors will not have to bother to go to the registration counter. Visitors who have signed up online after paying will get QR Code by e-mail.

3.5.3 Radio Frequency Identification (RFID)

Radio Frequency Identification (RFID) using RFID reader paired with two antennas on each reader to be able to identify RFID tag. Tag used is an active tag, to save the RFID reader power, so that the reader used is a passive reader. This is also because the active tag and passive reader can reach a wider area.

Figure 2: RFID Reader Location Scheme Integrated Database.
Source: Processed data, 2016.

The overall integration of Mount Semeru ascent system are not separated from database technology or database. Integrated databases can be interconnected between the parties using it, the Ranu Pani Area Management and TNBTS Regional Park Management. Utilization of the database system is expected to provide solutions to facilitate Mount Semeru ascent operations.

3.5.4 Operational Information System Design Mount Semeru Ascent

The operational information system requires input from several activities, so that it can produce the right output, with the elaboration in the following chart.

Figure 3: Operational Information System Design Mount Semeru Ascent.
Source: Processed data, 2016.

Figure 4: Entity Relationship Diagram (ERD).
Source: Processed data, 2016.

3.5.5 Operational Information System Design Mount Semeru Ascent

The benchmarking method used is the payback method which compares the cost to be spent on the annual income, resulting a payback point which is a turning point that has not reached a year. This means that the designed system costs can be covered with revenue in less than a year, resulting in a system with an estimated age of 10 years is very feasible to apply.

Cost							
One-time cost							
Hardware Acquitition							
No	Hardware	Qty		Price	Amount	Total	Price References
1	RFID bracelet (tag)	1,500	Unit	Rp 39,000.00	Rp 58,500,000.00		www.tokopedia.com (access date 26 July 2016)
2	RFID reader	5	Unit	Rp 70,200,000.00	Rp 351,000,000.00		www.atlasRFIDstore.com (access date 26 July 2016)
3	Outdoor antenna	10	Unit	Rp 2,686,500.00	Rp 26,865,000.00		www.atlasRFIDstore.com (access date 26 July 2016)
4	Fiber optic (15m/unit)	23.5	km	Rp 440,000.00	Rp 689,333,333.33		www.bhinneka.com (access date 26 July 2016)
5	Device server	1	Unit	Rp 73,900,000.00	Rp 73,900,000.00		www.bhinneka.com (access date 26 July 2016)
6	Computer	5	Set	Rp 4,700,000.00	Rp 23,500,000.00		www.bhinneka.com (access date 26 July 2016)
7	Printer	2	Unit	Rp 1,250,000.00	Rp 2,500,000.00		www.canon.co.id (access date 26 July 2016)
Total						Rp 1,225,598,333.33	
The Instalation Site Preparation							
	Pipe (4m/unit)	23.5	km	Rp 35,640.00	Rp 209,385,000.00		www.hargapipapvc.com (access date 26 July 2016)
Total						Rp 209,385,000.00	
Executor Training							
	Routine training for one month	20	days	Rp 500,000.00	Rp 10,000,000.00	Rp 10,000,000.00	Estimated
Recurring Cost							
	Maintanance	20	years	Rp 1,000,000.00	Rp 20,000,000.00		Estimated
	Insurance	20	years	Rp 1,000,000.00	Rp 20,000,000.00		Estimated
Total						Rp 40,000,000.00	
Total Cost						Rp 1,484,983,333.33	
Benefit							
		Domestic Visitors		Overseas Visitors			
		Amount	Ticket Price	Amount	Ticket Price		
Total Visitor in 2015		186,211	Rp 17,500.00	1,466	Rp 207,500.00		Bromo Tengger Semeru National Park Statistic 2015
			Rp 3,258,692,500.00		Rp 304,195,000.00		
Total Revenue						Rp 3,562,887,500.00	

Figure 5: Details of Costs and Income (Benefits).
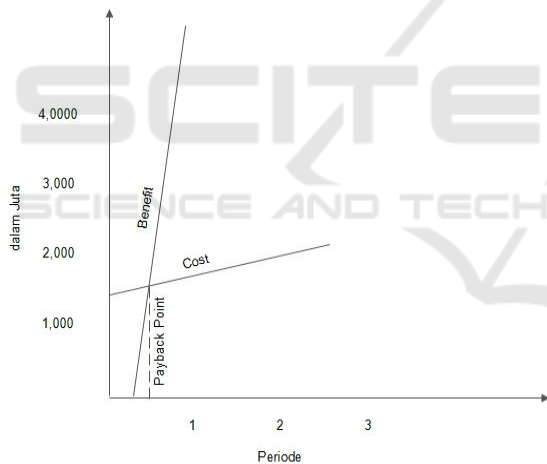Source: Processed data, 2016.

Figure 6: Payback Method Diagram in Cost and Benefit Analysis.
Source: Processed data, 2016.

3.5.6 Human Resources

Each information system needs to be run by human resources who certainly can understand the system well enough, as well as Mount Semeru ascent information system that is integrated requires employees who understand about the system being designed and implemented. So that the system can function as it should be.

4 CONCLUSIONS

Utilization of Mount Semeru ascent Operational Information System (OIS) based information system is used as the basis of Mount Semeru ascent system, so it can optimize the surveillance and action on the operational activities of Mount Semeru ascent. Manual supervision results a less rapid rescue, which can lead to fatalities including death. Delivery of the entire quota in real-time will provide up-to-date information, so there will be no more visitor buildup. Registration with the help of QR Code will make it easier for visitors and officers. QR Code is formed automatically and visitors can directly perform their own scan. The use of Radio Frequency Identification (RFID) technology is a form of direct control from the management to ensure that visitors are in line with their hikes. Handling the case of strayed visitors can also be quickly done, thus reducing the possibility of visitors straying for too long and occurring death, because life can not be purchased with anything.

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