FAKULTAS EKONOMI DAN BISNIS
Jl. Pawiyatan Luhur IV/1 Bendan Duwur Semarang 50234
Telp. (024) 8441555,8505003 (hunting) Fax.(024) 8415429 - 8445265
e-mail:unika@unika.ac.id http://www.unika.ac.id

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LETTER OF DUTY AFFIRMATION

No. 00176/K.6.4/ST/FEB/I/2019

To Whom It May Concern,

The Undersigned below, Dean of Faculty of Economics and Business, Soegijapranata Catholic University (SCU), hereby assigns:

N a m e	:	Dr. J. Wijanto Hadipuro, SE, MT. NIDN : 0621096301
Occupation	:	Lecturer, Full Time Faculty Member of Faculty of Economics and Business, Soegijapranata Catholic University (SCU) (Departement of Management)
Address	:	Jl. Pawiyatan Luhur IV / 1 Bendan Duwur, Semarang. 50234, Central Java, Indonesia
Activity	:	Presenter of Article entitled Enhanching Public Accountability through Digitalization of River Basin Management : The Case of Garang River, in The 2nd International Conference on Software Engineering and Information Management (ICSIM 2019)
Time and Place	:	On January 10 - 13, 2019, in Bali

This letter is issued for whatever it might deem useful to him.

Semarang, January 07, 2019
Dean of Faculty of Economics and Business

UNIVERSITAS KATOLIK SOEGIJAPRANATA FAKULTAS EKONOMI DAN BISNIS

Dr. Octavianus Digdo Hartomo, M.Si., Akt.

Certificate

Certificate for Oral Presentation

This certificate is awarded to:

B1-0031

Wijanto Hadipuro

With Paper Title:

Enhancing Public Accountability through Digitalization of River Basin Management: The Case of Garang River

For her/his attendance and delivery of an oral presentation in the 2nd International Conference on Software Engineering and Information Management (ICSIM 2019) and its workshop: the 2nd International Conference on Big Data and Smart Computing (ICBDSC 2019) held in Bali, Indonesia on January 10-13, 2019.

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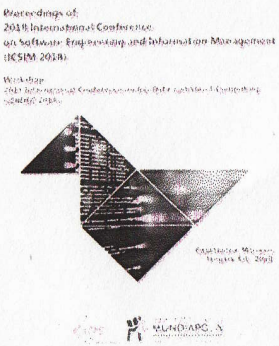

Submitted papers will be Peer-Reviewed (Double Blind) and the accepted ones will be published in the conference proceedings, which will be published in **International Conference Proceedings Series by ACM** (ISBN: 978-1-4503-6642-7), which is indexing in **Ei Compendex**, **Scopus**, IET etc. major databases.

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Only abstract is required if one does not want to publish the paper in the conference proceedings; otherwise, please submit a full paper.

1. Conference Template
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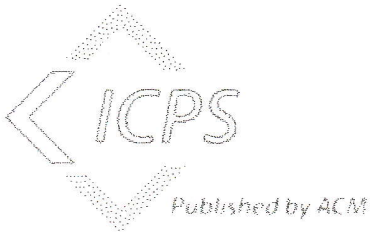

Edited by
Lily L. Chen

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SESSION VI

January 12, 2019

Session VI

[Service Science and Information Management]

10:00-12:15

Room 1

Chaired by Asst. Prof. Roseclaremath A. Caroro,

Technological Institute of the Philippines, Philippines

Co-chaired by Dr. Roselia C. Morco,

Technological Institute of the Philippines, Philippines

9 presentations-

B1-0031, B1-0036, B1-0056, B1-0060, B1-0055, B2-0019, B1-0016, B1-0025, B1-0071

***Note:**

Please arrive 30 minutes ahead of the sessions to prepare and test your PowerPoint.

Certificate of Presentation will be awarded to each presenter by the session chair when the session is over.

One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded when the session is over.

SESSION VI

B1-0031 **10:00-10:15**	Enhancing Public Accountability through Digitalization of River Basin Management: The Case of Garang River **Wijanto Hadipuro**, Djoko Suwarno and Suyanto Edward Antonius Soegijapranata Catholic University, Indonesia **ABSTRACT** Although Garang River Basin has belonged to priority basin to be rehabilitated since 2010, today the quality of the water still cannot meet the requirements of drinking raw water. A combination of wireless sensors network, data owned by actors (government and non-government) involved in the management of the river, and Volunteered Geographic Information (VGI) for river basin management are introduced in this paper to solve the problems. And, by inviting public citizens as VGI to get involved in public service management, it will improve the accountability of the (government) public service offices. The public can monitor the quality and the quantity of the river water in a real-time basis through Facebook Group, and they can report the changes of the quantity and the quality of the water to the authority and also monitor the response to their reports.
B1-0036 **10:15-10:30**	Street vendor management-Why not? Hoang Huu Son, **Tran Thi Phuong Lien**, Nguyen Tien Thao, Nguyen Tuan Nam and Hoang Van Anh Vietnamese Academy of Finance, Viet Nam **ABSTRACT** Nowadays, managing informal economics sectors in general and street vending in particular in developing countries still face various inadequacies, especially when it comes to investigation and handling illegal behaviors: selling fake or low-quality products, harassment and tax evasion. In order to overcome these issues, a new street vendor management system is proposed for replacing manual traditional processes. With the benefit of QR code and mobile techniques, hawkers, customers and authorities can all access to manage and supervise street vending. The paper also suggests changes in public policies for street vendors' management, initial implementations for system evaluation are presented and discussed accordingly.
B1-0056 **10:30-10:45**	Evaluating the Development of E-Government in Indonesia **Alvedi Sabani**, Hepu Deng and Vinh Thai RMIT University, Australia **ABSTRACT** This paper presents an analysis of the challenges for the development of electronic government (e-government) in Indonesia. The study mainly focuses on the implementation of e-government in the transaction stage. The type of e-government is discussed, the stage of e-government development is evaluated, and the progress of e-Indonesia initiative is assessed. There are various obstacles to the development of e-government in Indonesia including poor ICT infrastructure, inadequate human

ENHANCING PUBLIC ACCOUNTABILITY THROUGH DIGITALIZATION OF RIVER BASIN MANAGEMENT: THE CASE OF GARANG RIVER

Wijanto Hadipuro
Soegijapranata Catholic University
Jl. Pawiyatan Luhur IV/1
Semarang, Indonesia
62-8441555
hadipuro@unika.ac.id

Djoko Suwarno
Soegijapranata Catholic University
Jl. Pawiyatan Luhur IV/1
Semarang, Indonesia
62-8441555
dj.suwarno@unika.ac.id

Suyanto Edward Antonius
Soegijapranata Catholic University
Jl. Pawiyatan Luhur IV/1
Semarang, Indonesia
62-8441555
seantonius@unika.ac.id

ABSTRACT
Although Garang River Basin has belonged to priority basin to be rehabilitated since 2010, today the quality of the water still cannot meet the requirements of drinking raw water. A combination of wireless sensors network, data owned by actors (government and non-government) involved in the management of the river, and Volunteered Geographic Information (VGI) for river basin management are introduced in this paper to solve the problems. And, by inviting public citizens as VGI to get involved in public service management, it will improve the accountability of the (government) public service offices. The public can monitor the quality and the quantity of the river water in a real-time basis through Facebook Group, and they can report the changes of the quantity and the quality of the water to the authority and also monitor the response to their reports.

CCS Concepts

- **Applied computing~E-government**

Keywords
Garang River Basin; Volunteered Geographic Information; digitalization; public accountability.

1. INTRODUCTION
The convergence of governance theory and network society has become an important topic [3], also in river basin management. Governance theory emerged in 1980s [4; 6] as the result of the bankruptcy of many governments all over the world. According to Rakodi [13] and Stoker [14], governance implies that public services are not a monopoly of the governments but involving non-governmental actors such as private sectors and civil society. Almost at the same time, network society has also become an important topic in public service management [2]. Bras et al. [1] define network society as a set of nodes and the set of ties representing some relationship, or lack of relationship, between nodes.

Before the convergence was settled especially for river basin management, the development of Information and Communication Technology (ICT) not only has made easier for actors to communicate one to another, but it also brings about a new concept of digital network, including involving ordinary people to public service management. Wesselink et al. [15] is one of the authors who introduces that active public participation in public services through mobile application has made public utility become more responsive and accountable.

The introduction of geographic information produced by people who have little formal qualification or citizens as sensors [7] is called Volunteered Geographic Information (VGI) [12]. According to Poser and Dransch [12], VGI can enhance, update or complement existing geospatial datasets. Some authors use VGI for flood management [5], combine VGI with wireless sensors network for flood management [8], and online monitoring river basin [16].

This paper is intended to deploy a combination of wireless sensors network, data owned by actors (government and non-government) involved in the management of the river, and VGI for river basin management without disregarding the importance of the validity of the VGI for Garang River Basin in Central Java, Indonesia. The intention is that there will not be the duplication of data produced by stakeholders of Garang River by sharing and updating data by all stakeholders of Garang River. The platform used is Facebook Group which is a very popular social media in Indonesia. With all of these, hopefully, Garang River can be managed for its continuity, the sustainable quality, and quantity of the river water.

There are three rivers in Garang River Basin namely Garang River, Kreo River, and Kripik River. The water from all the three rivers is the source of Tirta Moedal piped water supply company owned by Semarang City Government. Although Garang River Basin has belonged to priority basin to be rehabilitated since 2010 [10], today the quality cannot meet the requirements of drinking raw water.

2. THE CASE: GARANG RIVER BASIN
Garang River Basin is located at 110^{o} 11' 28" – 110^{o} 25' 59'' and 6^{o} 56' 46" – 7^{o} 11' 47" longitude. It covers an area of 21,277.36 ha in three cities and municipality of Semarang City (53.82% of the total area), Semarang Municipality (33.38%) and Kendal Municipality 12.79%).

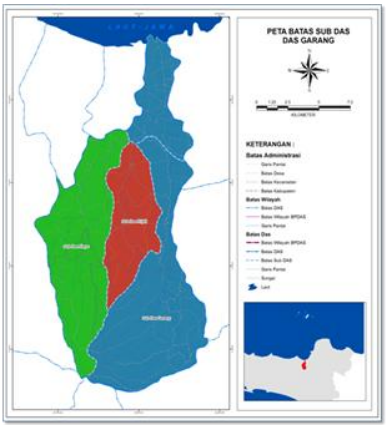

Figure 1. Garang River Basin

Garang River Basin is divided into three sub river basin, namely Garang Sub River Basin which covers an area of 10,773 ha, Kreo Sub River Basin of 6,856 ha and Kripik Sub River Basin of 3,647 ha. The main river course is Garang River which length is 77.05 km (26.83 km in a straight line). The upper end is located at 1,700 meters above sea level which slope is 69^{o} which constitutes the vulnerability of the basin from hydrological problems.

According to the Central Java Governor Act No. 156 of 2010 about Water Use and the Management of Garang River Water Quality in Central Java, the basin is divided into seven segments [9].

Segment 1 is the upper side of Garang River. Its length is 12.2 km and covers the Semarang Municipality and Semarang City. Most of the activities include agriculture and farming, industry, cattle breeding, and housing area. Segment 2 is located in Semarang City which length is 11.5 km. Most of the industries located in this area potentially pollute this segment. Besides industries, housing area is the dominated this area. Segment is 3 also in Semarang City. Its length is only 2.4 km and most of the land in this area is for housing area and agriculture. All these three segments water should meet the requirements as raw water for drinking.

Segment 4 is a cross-section between Garang sub river basin and Kreo sub river basin. This segment is located in the three local governments of Semarang City, Semarang Municipality and Kendal Municipality. Its length is 15.5 km. Most of the area is used for agriculture and farming, industry, final disposal of Semarang City solid waste, and housing area. At the upper part of Kreo River locates Jatibarang Dam.

Segment 5 is a cross-section of Garang sub river basin and Kripik sub river basin. The upper part of Kripik sub river basin locates at Semarang Municipality. The length of this segment is only 2.6 km.

The intake of PDAM Tirta Moedal of Semarang City is located in Segment 6. In this segment, there are also industries, Karyadi hospital, and housing area. While in Segment 7 which is also the lower part of Garang River which is known as Banjir Kanal Barat, besides housing area, there are also some small and medium enterprises such as tofu and tempeh and also housing area.

3. RIVER TRACKING AND THE RESULT OF WATER QUALITY TEST

After doing a river tracking and take some water example to be tested for its quality. The wireless sensors are put in some points of the segment.

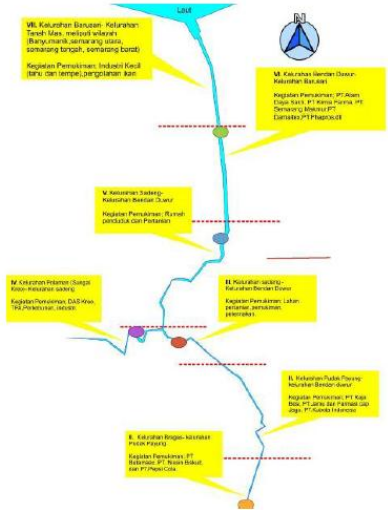

Figure 3. The Places for Wireless-Sensors

There are two main reasons for putting the wireless sensors at the seven places in Figure 3. First, it is based on the result of the water quality test.

Table 1. *Coliform* and *Fecal Coli*

Parameter	Standard	Segment					
		I	IV	V (1)	V (2)	VI	VII
Total *Coliform*	**10.000**	**2.400**	**1.300**	**> 16.000**	**5.400**	**3.500**	**5.400**
Total *Fecal Coli*	**2.000**	**1.300**	**270**	**> 16.000**	**3.500**	**3.500**	**3.500**

Source: Water Quality Laboratory Test (2018)

Note: numbers in grey are the numbers that beyond the standard for raw water for drinking

Table 2. Physical Parameters

Parameter	Standard	Segment					
		I	IV	V (1)	V (2)	VI	VII
Temperature(^{0} C)		**23,6**	**23,3**	**23,4**	**23,3**	**23,4**	**23,3**
Total Dissolved Solid	**1.000**	**117**	**135**	**160**	**135**	**138**	**< 10.000**
Total Suspended Solid	**50**	**10**	**≤ 5**	**15**	**≤ 5**	**27**	**406**

Source: Water Quality Laboratory Test (2018)

Note: numbers in grey are the numbers that beyond the standard for raw water for drinking

Table 3. Chemical Parameter

Parameter	Standard	Segment					
		I	IV	V (1)	V (2)	VI	VII
pH	6,0 – 9,0	8,5	9,5	7,9	9,3	8,8	7,9
Nitrit as N	0,06	0,01	0,14	0,01	0,07	0,08	0,13
Ammonia	0,5	≤ 0,03	1,58	0,07	0,11	0,1	1,03
Chromium val. 6	0,05	≤ 0,008	≤ 0,008	0,02	≤ 0,008	≤ 0,008	≤ 0,008
Sulfat	400	4,9	1356	22,8	25,8	25,2	1258
Fero	0,3	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07
Mangan	0,1	≤ 0,03	≤ 0,03	0,05	≤ 0,03	≤ 0,03	0,32
Cu	0,02	≤ 0,01	≤ 0,01	≤ 0,01	≤ 0,01	≤ 0,01	≤ 0,01
Zink	0,05	0,10	≤ 0,02	0,11	≤ 0,02	≤ 0,02	0,11
Chloride	600	6	11	17	14	12	3970
COD	10	16	16	87	16	23	187
BOD	2	4	3	8	5	6	21
Flouride	0,5	0,19	0,1	0,06	0,14	0,08	0,64
Nitrat as N	10	1,2	0	0	0,02	0	0
Arsen	0,05	≤ 0,01	≤ 0,01	≤ 0,01	≤ 0,01	≤ 0,01	≤ 0,01
Pb	0,03	≤ 0,03	≤ 0,03	≤ 0,03	≤ 0,03	≤ 0,03	≤ 0,03
Cadmium	0,01	≤ 0,006	≤ 0,006	≤ 0,006	≤ 0,006	≤ 0,006	≤ 0,006
Selenium	0,01	≤ 0,005	≤ 0,005	≤ 0,005	≤ 0,005	≤ 0,005	≤ 0,005
Hg	0,001	≤ 0,0002	≤ 0,0002	≤ 0,0002	≤ 0,0002	≤ 0,0002	≤ 0,0002
Sianida	0,02	0,009	0,01	0,009	0,008	0,01	0,01
Chlor	0,03	0,14	0,15	0,18	0,19	0,17	0,22
Sulfide	0,002	≤ 0,04	≤ 0,04	≤ 0,04	≤ 0,04	≤ 0,04	≤ 0,04
Deterge nt	200	41,5	70,5	66,1	69,6	54,9	220
Fenol	1	300	300	410	360	430	590
Fosfat	0,2	0,98	0,88	1,37	1,43	1,01	1,58
Greese	1000	4000	4000	5000	4000	3000	5000

Source: Water Quality Laboratory Test (2018)

Note: numbers in grey are the numbers that beyond the standard for raw water for drinking

The second reason of putting the wireless sensors at the seven places is in order to know the condition of the water of three rivers before the cross sections; and also the possible changes in quality after the activities which are assumed might influence the changes such as the location of industries and housing areas. The location of the seven places also might it possible to give times for anticipation for the Tirta Moedal piped water supply company to response of the changes in the quality of the raw water.

4. PLATFORM

The platform used is Facebook Group. Facebook Group will be used to integrate the information from (1) the actors involved in the management of Garang River such as the Central Java Office of Public Works, Water Management and Spatial Planning; Pemali Juwana River Management, Tirta Moedal piped water supply company, Meteorological and Geophysical Office, data from the wireless sensors and also public citizens who give reports on the changes in the quality and quantity of the water of Garang River.

The information from public citizen will be double checked before it will be published in the Facebook Group. The first check is about the authority which is verified by the membership to the group, and second, for non-member, the double check will be done by comparing the information from the public citizen with the data from the wireless sensors.

The data from wireless sensors will be displayed in a real time basis in the form of graphics and tables. The wireless sensors used are pH meter, GPS for locating the sensors, temperature meter, elevation of water level, and turbidity. In future time all the data can be used as inputs for mathematical modeling to forecast the future, for example, the changes in the land use, and also identify the probable contaminants and their probable sources for law enforcement. Links on the Facebook Group to the wireless sensors data and other actors' data are shown in the Facebook Group.

5. FINAL REMARKS

There are still many things to be developed. However, a network river basin management might improve the efficiency and effectivity of Garang River Basin management and avoid duplication of data and efforts to collect the data such as mentioned by Pedegral et al. [11]. And hopefully such as mentioned by Wesselink et al. [15], inviting public citizens to get involved in public service management will improve the accountability of the (government) public service offices.

6. ACKNOWLEDGMENTS

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the Government of Indonesia. The support by the Ministry is gratefully acknowledged. Any errors of fact or intepretation are solely those of the authors.

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