

Table of contents

Volume 794

2021

[◀ Previous issue](#) [Next issue ▶](#)

4th International Conference on Eco Engineering Development 2020 10-11 November 2020, Banten, Indonesia

Accepted papers received: 08 June 2021

Published online: 02 August 2021



Table of contents

Volume 794

2021

◀ Previous issue Next issue ▶

4th International Conference on Eco Engineering Development 2020 10-11 November 2020, Banten, Indonesia

Accepted papers received: 08 June 2021

Published online: 02 August 2021

Open all abstracts

Preface

OPEN ACCESS 011001

Preface

+ Open abstract  View article  PDF

OPEN ACCESS 011002

Peer review declaration

+ Open abstract  View article  PDF

Sustainable Infrastructure and Transportation, Energy, Water and Renewable Energy

OPEN ACCESS 012001

Changes in the implementation of concrete in situ work method to a precast method

JB Wowok Birowo, Made Suangga and Harimawan

+ Open abstract  View article  PDF

OPEN ACCESS 012002

Development of WBS (Work Breakdown Structure) dictionary and checklist of mechanical and electrical works in stadium construction for safety planning

R S Ramadhanty, L S R Supriadi and Y Latief

+ Open abstract  View article  PDF

OPEN ACCESS 012003

Mechanical properties of porous concrete and design recommendation for low traffic road pavement in Indonesia

G Ramadhan, F Muslim and L Sagita

[+](#) Open abstract [View article](#) [PDF](#)

OPEN ACCESS

012004

Construction cost effectiveness comparison on I-girder bridge and box culvert

Irpan Hidayat, Made Suangga and Felix Hartanto

[+](#) Open abstract [View article](#) [PDF](#)

OPEN ACCESS

012005

How pandemic and the industry 4.0 era constraint: the perspective of authentic leadership on innovation

Tyna Yunita, Harjanto Prabowo, Adler Haymans Manurung and Mohammad Hamsa

[+](#) Open abstract [View article](#) [PDF](#)

OPEN ACCESS

012006

Increasing the private investment scheme effectiveness of Indonesia public housing through institutional integration

M Y Hariagung, Y Latief and A D Rarasati

[+](#) Open abstract [View article](#) [PDF](#)

OPEN ACCESS

012007

Numerical modelling and cost-duration analysis of roof structure design changes

L Kristianto, A D Rarasati and J Sjah

[+](#) Open abstract [View article](#) [PDF](#)

OPEN ACCESS

012008

Analysis of the dominant factors causing cost overrun in building construction projects

Andyka Bayu Widiaputra and Putri Arumsari

[+](#) Open abstract [View article](#) [PDF](#)

OPEN ACCESS

012009

Pipeline installation using horizontal directional drilling method (HDD)

Putri Arumsari and Elisa Tanuwijaya

[+](#) Open abstract [View article](#) [PDF](#)

OPEN ACCESS

012010

Risk factors analysis affecting project time delay in construction projects using CATWOE analysis

Wahyu Rachmayanti and Putri Arumsari

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012011

Seismic performance analysis of retrofitting building structure with type X bracing

Irpan Hidayat, Made Suangga, Riza Suwondo and Muhamad Sami

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012012

Analysis of clash detection and quantity take-off using BIM for warehouse construction

M.R. Elyano and Yuliasuti

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012013

Rigid pavement optimization by using empirical mechanistic method and Kenpave software

Shinta Gabriela and Adelia Dwidarma Nataadmadja

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012014

Rapid assessment for housing in Indramayu, West Java-Indonesia

Putri Arumsari, Juliasuti, Irpan Hidayat, Andrew John Pierre and Casey AUFAR Pahlevi

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012015

Analysis of Modified Bolotin Method on maximum deflection of three stiffeners plates

Meilani, Khristian Edi Nugroho Soebandrija and Sigit Wijaksono

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012016

Maximum deflection of three span continuous bridge using rotation data based on 3 dimensional model

M. Suangga and T. Haripriambodo

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012017

Interaction studies between geotextile and fill material

Kurnia Syawaludin, Andryan Suhendra, J L Lie and I G Mahardika

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012018

Effectivity of underwater dam for reducing reservoir sedimentation, case study:
Cipanundaan reservoir, West Java, Indonesia

Dian Indrawati, Adi Suryo Abdillah, Muchlis Ansori, Mohammad Bagus Adityawan and Achmad Hariadi

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012019

Mbay city's eco-hydraulic concept leads to sustainable water supply and management

C L Susilawati and Hartono

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012020

Construction management risk and digital technology: lens of civil engineering, industrial engineering and architecture of eco waste water treatment construction

Meilani and Ken Soebandrija

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012021

Research on the effect of SS316L electrode plate treatment on HHO gas production performance

Rudy Purwondho, Ajat Sudrajat and Handoko

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012022

Sustainability and affordability analysis for One Million Housing Program a case in Cileungsi District Bogor Regency West Java

Dian Ratri Cahyani and Ayomi Dita Rarasati

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012023

Development of Eco-Airport Model to Measure Environmental Noise Footprint in Supporting Airport Sustainability

Wahyu Sardjono, Haryoto Kusnopranto, Tri Edhi Budhi Soesilo and Gabriel A. Kristanto

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012024

Non-linear analysis of seismic performance of low-rise concrete buildings in Indonesia

Riza Suwondo, Dave Mangindaan, Lee Cunningham and Sohaib Alama

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012025

Analysis on risk management of occupational health and safety on ongoing building project

A B Putra, B A Putra, Meilani, A Suhendra and P Arumsari

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012026

Study the correlation of natural frequency and damage index of 2D steel EBF-vertical shear link

Sarah F Nugroho, M Orientilize and B O B Sentosa

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012027

The Framework of Quality Culture Maturity in Indonesian Construction Company to Reduce the Construction Failure Rate

Febrian Hera Pratama, Rully Andhika and Yusuf Latief

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012028

Interrelation between policies and safety culture on safety performance and project performance in the construction sector

R A Machfudiyanto, Y Latief and Y Indah

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012029

System Dynamics Modeling for Petroleum Exploitation Using the 'Drifting Goals' Standard Model

Wahyu Sardjono, Haryoto Kusnoputranto, Tri Edhi Budhi Soesilo and A. Kristanto

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012030

Performance of Wearing Surface with Addition of Wetbond-SP

Adelia DwidarmaNataadmadja, Eduardi Prahara, Oki Setyandito, Kris Ade Sudiyono and Jose Leonardo Lie

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012031

Geofoam: A potential for Indonesia's soil problem II

A Gunawan

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012032

Modeling existing buildings three-dimensional (3D) using unmanned aerial vehicles: A study case in Binus Syahdan Campus Building

Irpan Hidayat, Riza Suwondo, Made Suangga and Casey Aufar Pahlevi

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012033

Green building construction rating assessment in The LL Dikti Office Building, XIV Biak Region, Papua

Vidi J.D. Papare and Caroline Maretha Sujana

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012034

Promoting Solar Home System as Renewable Energy System Using Limited Available Resources

J Linggarjati and S M N A Senanayake

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012035

Flutter Analysis of The Sunda Strait Suspension Bridge

M. Suangga, K. Subali, I. Hidayat and H. Irpani

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012036

Effects of Pile Configuration on The Behaviour of Jetty Structure Subject to Lateral Loads

Gerardo H.M. Siagian, Oki Setyandito, Riza Suwondo and Andrew John Pierre

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012037

Integration building information modeling (BIM) to track the time for controlling of budget and labor productivity (case study: warehouse project)

Rifqi Waladi Wicaksono, Juliastuti and Putri Arumsari

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012038

Study of Bridge Parameters on Aerodynamic Performance of Steel Arch Bridge

Made Suangga, Selly Hena Permatasari and Herry Irpani

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012039

Analysis of Earth Retaining Walls Reinforced by Metallic Strip or Geogrid

A Suhendra, Sutikno, J L Lie and I G Mahardika

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012040

Water Management Evaluation for Upgrading Tidal Irrigation System, Katingan, Kalimantan

A Khomaini Fauzan, Budi S Wignyosukarto and Rachmad Jayadi

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012041

The role of hydro-mechanical vegetation in slope stability: A review

Yulia Amirul Fata, Hendrayanto, Kukuh Murtilaksono and Erizal

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012042

Use of *Cyperus alternifolius* and *Eichhornia crassipes* for removing heavy metal from shrimp farm effluent in wetlands

Mai Chi-Tuan, Thanh Tran and Luong Quang-Tuong

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012043

Development of application tools for determining cropping patterns based on water availability

Tri Susanti, Istiarto and Djoko Legono

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012044

Analysis of river water quality in the upstream of the Code River, Indonesia

J Ikhsan, R Kurniati and M R Rozainy

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012045

Development of Dictionary and Checklist based on WBS (Work Breakdown Structure) of Structure Works in Stadium Construction for Safety Planning

Pandu Anugerah Ikarwitaza, Leni Sagita Riantini and Yusuf Latief

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012046

Perception Analysis of Airport Noise on Environment, Sosial, and Economic at Halim Perdana Kusuma Airport

Wahyu Sardjono, Haryoto Kusnoputranto, Bagus Ferry Agrayanto, Tri Edhi Budhi Soesilo and Gabriel A. Kristanto

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012047

Comparison of seismic load calculation based on SNI 1726-2012 and SNI 1726-2019 to capacity of elements on low level building

Irpan Hidayat and Michael Loren

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012048

Effects of Void Characteristics on Compressive Strength of Permeable Mortar Paver and Design Recommendation for Parking Area

BY Marulitua, F Muslim and L Sagita

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012049

Ecological Footprint Model of Soekarno-Hatta International Airport from the Perspective of the Local Community

Wahyu Sardjono, Haryoto Kusnoputranto, Tri Edhi Budhi Soesilo and Kristanto Gabriel A.

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012050

Conceptual framework for the development of West Java Zero Waste Management Index

E J Sundana, A D Sutadian and I Juwana

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012051

Mode Split Analysis for Transportation in Residential and Office of Transit-Oriented Development (TOD)

Mohammed Ali Berawi, Miranda Calista and Gunawan

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS 012052

Owner's motivation to construct the green buildings in Jakarta, Indonesia

Irish Ririhena and Caroline Maretha Sujana

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012053

Analysis of Strategic Variables for Sustainable Infrastructure and Transportation in Rural Area of Serang Regency, Banten Province

Y Wijayanti, M Anda, O Setyandito, M Suangga and Juliastuti

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012054

Structure value engineering using ETABS for midrise building

D. Leonardo, Juliastuti, P. Arumsari and A. A. Pramudya

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012055

Plant Redesign for pH Neutralization Process of Textile Wastewater Treatment

Elfi Yulia, Estiyanti Ekawati and Eko Mursito Budi

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012056

Comparative study of Infrastructure Asset Management (IAM) between Papah irrigation areas in Indonesia and Cu-Chi irrigation areas in Vietnam

C Cahyono and Juliastuti

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012057

Study of Modeling Method Selection in Flood Discharge Calibration Using HEC-HMS Software

C Cahyono and Juliastuti

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012058

Oblong Bridge Pier Shape Influence toward Flow Velocity Characteristic and Scour Depth

Casey Aufar Pahlevi, Oki Setyandito, Istiarto, Kris Ade Sudiyono, Andrew John Pierre and Juliastuti

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012059

Flow Characteristics and Scour Depth in Lenticular Shaped Pier: Case Study at Ciujung Bridge, Banten

Casey AUFAR Pahlevi, Oki Setyandito, Andrew John Pierre, Juliastuti and M Anda

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012060

Qualitative assessment of deterioration embankment dam using index condition and annual probability of failure (APF) using event tree method

Juliastuti, B. Thoyibahri, C Cahyono and O. Setyandito

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012061

Priority Determination of Repairing Embankment Dam using Analytical Hierarchy Process (AHP), Case Studies: Saguling Dam and Djuanda Dam

Juliastuti, I. Rico, C Cahyono and Y. Wijayanti

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012062

Analysis of Vehicle Type for Roadroid Application

E. Prahara, A. D. Nataadmadja, M. A. Arofah and R. G. Pionar

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012063

Correlation of Vehicle Speed to Road Surface Condition Using Roadroid Application

E. Prahara, A. D. Nataadmadja, M. A. Arofah and R. G. Pionar

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012064

Simple Span Bridge Loading Based on Weight in Motion Data

M. Suangga and Mahathir

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012065

Sustainability in Construction Work: A Perspective on Accidents and Building Failure Mitigation in Indonesia

Kimron Manik, O N Putri, S F Azzahra, Martin Anda, Juliastuti and Y Wijayanti

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012066

Flow Characteristics of Stilling Basin, Case Study: Karian Dam, Central Java Province

Dewi Rizky Lestari, Oki Setyandito, Michael Loren, Yureana Wijayanti and Juliastuti

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012067

Flood Observation Map in Banten Province Using Radar Images, Case Study: Cidanau, Ciujung, Cidurian River Basin

Propezite Nurhutama Mustain, Airlangga Mardjono, Idham Riyando Moe, Evi Agustia, Teguh Mulia Aribawa, Adam Prana and Bai Yanbing

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012068

Food Estate Program in Central Kalimantan Province as An Integrated and Sustainable Solution for Food Security in Indonesia

Sigit Marwanto and Ferdi Pangestu

[+ Open abstract](#) [View article](#) [PDF](#)

Sustainable Industry and Green Manufacturing

OPEN ACCESS

012069

Participatory ergonomics in developing e-waste collection network of UNTAR-UPH industrial engineering students

H J Kristina, A Christiani and C O Doaly

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012070

E-waste for interior accessories: an exploration of material recycling

Reno Fanthi, Ade Ariyani Sari Fajarwati and Siti Chadijah

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012071

Correlation of driving behavior with the need for self-recovery, work motivation, and emotional intelligence of an app-based motorbike taxi drivers

Annisa Azzahrah Subroto and Rida Zuraida

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012072

Selection of subcontractor vendor using analytic hierarchy process (AHP) method in construction company

Fransisca Dini Ariyanti and Annatania Calista Putri

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012073

Decision making in the warehouse expansion strategy at PT Dwitama Global Persada

Fransisca Dini Ariyanti, Raquel and Dylan Velio

+ Open abstract

View article



PDF

OPEN ACCESS

012074

Implementation of lean construction and critical chain project management (CCPM) for waste management and work estimation on the Ciawi dam construction project

Fransisca Dini Ariyanti, Annatania Calista Putri and Diah Ayu Ningtyas

+ Open abstract

View article



PDF

OPEN ACCESS

012075

Sustainability and eco-friendly movement in movie production

Meilani Meilani

+ Open abstract

View article



PDF

view all our sites ▾

IOP regional sites

China

Latinoamérica

About us | Publications ▾ | Researchers | Librarians ▾ | Partners ▾ | Open Physics | News | Jobs ▾

IOP Publishing



Contacts | Bookstore | Sustainability



Who do you want to contact

Editorial ▾

[view all our sites](#) ▾[IOP regional sites](#)[China](#)[Latinoamérica](#)**IOP Publishing**[About us](#) | [Publications](#) ▾ | [Researchers](#) | [Librarians](#) ▾ | [Partners](#) ▾ | [Open Physics](#) | [News](#) | [Jobs](#) ▾[Contacts](#) | [Bookstore](#) | [Sustainability](#)**HEAD OF PUBLISHING OPERATIONS****Marc Gillett**

Contact Marc with questions about journal submission and article reviewing.

**ASSOCIATE DIRECTOR, JOURNALS STRATEGY****Daniel Keirs**

Contact Daniel for further information on IOPP's Open Access strategy.

ASSOCIATE DIRECTOR, JOURNALS PRODUCT DEVELOPMENT**Tim Smith**

Contact Tim with questions about IOPP's subject coverage, or to submit suggestions about new journal launches

**HEAD OF BOOKS AND CONFERENCE PROCEEDINGS PUBLISHING****David McDade**

[view all our sites](#) ▾

[IOP regional sites](#)

[China](#)

[Latinoamérica](#)

IOP Publishing



[About us](#) | [Publications](#) ▾ | [Researchers](#) | [Librarians](#) ▾ | [Partners](#) ▾ | [Open Physics](#) | [News](#) | [Jobs](#) ▾

[Contacts](#) | [Bookstore](#) | [Sustainability](#)



HEAD OF PRODUCTION

Liz Martin

Contact Liz with questions about the production process for journal, books and conference proceedings.



ASSOCIATE DIRECTOR, CONTENT AND ENGAGEMENT MARKETING

Claire Webber

Contact Claire if you have questions about IOPP's marketing activities and conference attendance.



view all our sites ▾

IOP regional sites

China

Latinoamérica

About us | Publications ▾ | Researchers | Librarians ▾ | Partners ▾ | Open Physics | News | Jobs ▾

IOP Publishing



Contacts | Bookstore | Sustainability

Books

Checking the proofs of your journal article

Article structure

Editing services

Contacts

Copyright notice

Environmental policy

Disclaimer terms

Modern Slavery Policy

Gender Pay Gap Report

Advertising policy

Federated access privacy statement

Journal policies

SOCIAL



view all our sites ▾

IOP regional sites

China

Latinoamérica

IOP Publishing



[About us](#) | [Publications ▾](#) | [Researchers](#) | [Librarians ▾](#) | [Partners ▾](#) | [Open Physics](#) | [News](#) | [Jobs ▾](#)

[Contacts](#) | [Bookstore](#) | [Sustainability](#)

also developed by scimago:



SCIMAGO INSTITUTIONS RANKINGS

SJR

Scimago Journal & Country Rank

Enter Journal Title, ISSN or Publisher Name



Home

Journal Rankings

Country Rankings

Viz Tools

Help

About Us

Intl. J of Distrib. Sens. Net

Hindawi

Open

IOP Conference Series: Earth and Environmental Science

COUNTRY

[United Kingdom](#)

Universities and research institutions in United Kingdom

SUBJECT AREA AND CATEGORY

[Earth and Planetary Sciences](#)
└ [Earth and Planetary Sciences \(miscellaneous\)](#)

[Environmental Science](#)
└ [Environmental Science \(miscellaneous\)](#)

[Physics and Astronomy](#)
└ [Physics and Astronomy \(miscellaneous\)](#)

PUBLISHER

[IOP Publishing Ltd.](#)

H-INDEX

34

PUBLICATION TYPE

Conferences and Proceedings

ISSN

17551307,
17551315

COVERAGE

2010-2021

INFORMATION

[Homepage](#)
[How to publish in this journal](#)







Intl. J of Distrib. Sens. Net




International Journal of Distributed Sensor Networks is an Open Access Journal. [Submit Now](#)

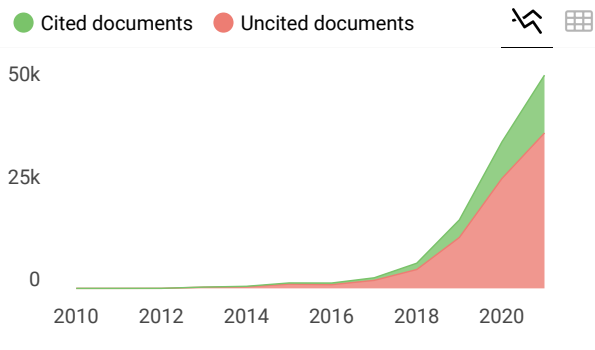
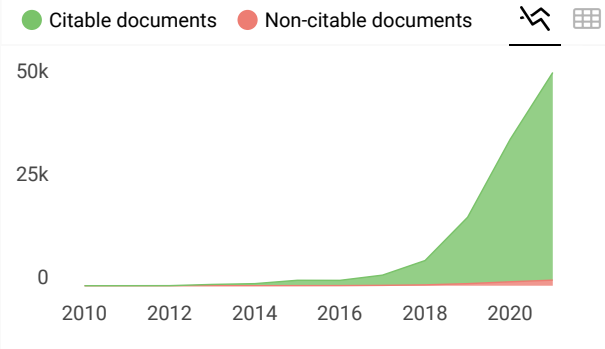
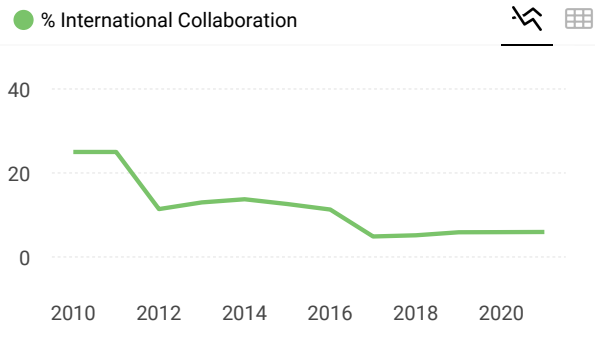
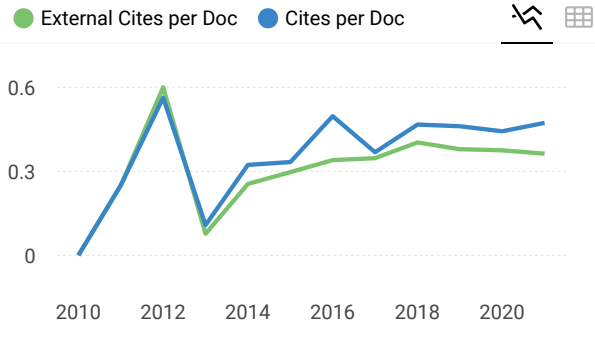
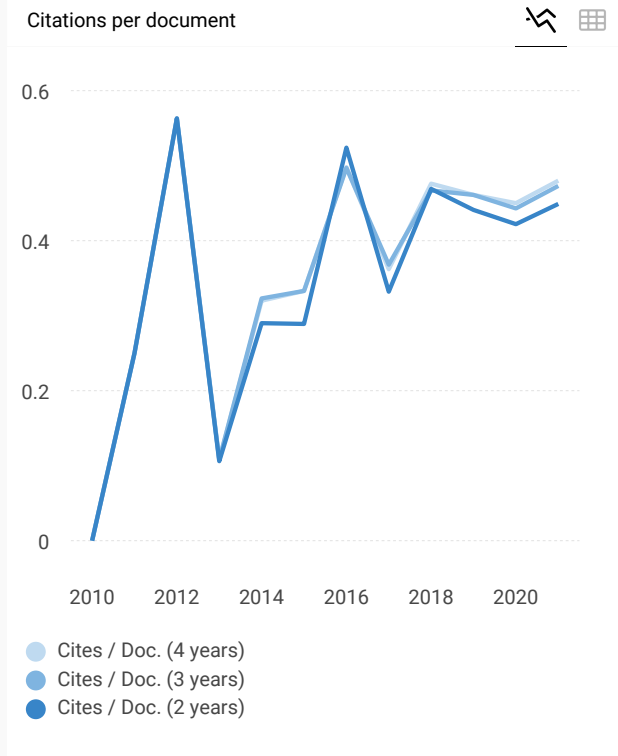
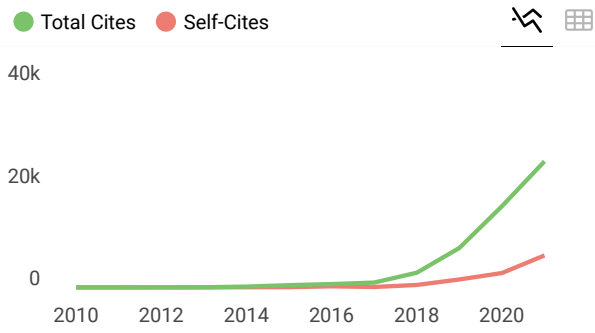
SCOPE

The open access IOP Conference Series: Earth and Environmental Science (EES) provides a fast, versatile and cost-effective proceedings publication service.

 Join the conversation about this journal

 SJR  

 Total Documents  



IOP Conference Series: Earth and Environmental...

Not yet assigned quartile

SJR 2021
0.2

powered by scimagojr.com

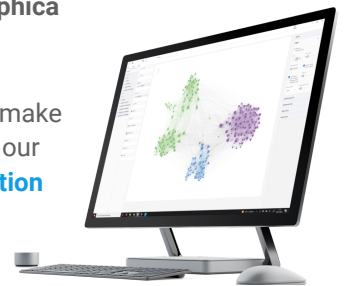
← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimagojr.com" style="border: 1px solid #ccc; padding: 5px; display: inline-block;">https://www.scimagojr.com
```

SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool.**



Metrics based on Scopus® data as of April 2022



Abdel Moktader Abdel Aziz El-Sayed 3 weeks ago

Nahla A. El Sayed and El sayed Abdel Moktader A. 2021 IOP Conf. Ser.: Earth Environ. Sci. 906 012004

Is this scopus or not, and what is the impact factor of this magazine?

← reply



Melanie Ortiz 3 weeks ago

SCImago Team

Dear Abdel, thank you very much for your comment. SCImago Journal and Country Rank uses Scopus data, our impact indicator is the SJR. We suggest you consult the Journal Citation Report for other indicators (like Impact Factor) with a Web of Science data source. Best Regards, SCImago Team



NAJI 7 months ago

Hello Dear

I participated as a corresponding author in IOP conf .series: Earth and Environment Science 877(2021)012046

I want do this IOP still in Scopus ???

kind regards

← reply



Melanie Ortiz 7 months ago

SCImago Team

Dear Naji, thank you very much for your comment. We suggest you consult the Scopus database directly. Keep in mind that the SJR is a static image (the update is made one time per year) of a database (Scopus) which is changing every day.

The Scopus' update list can also be consulted here:

<https://www.elsevier.com/solutions/scopus/how-scopus-works/content>

Best Regards, SCImago Team



Alharia Dinata 2 years ago

IOP Conference Series: Earth and Environmental Science - Volume 708 is not available in Scopus.

← reply



Melanie Ortiz 2 years ago

SCImago Team

Dear Alharia,

thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you contact Scopus support:

https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/scopus/

Best Regards, SCImago Team



Vani 2 years ago

good evening, whether this journal is Q4 or Q2 ?

← reply



Melanie Ortiz 2 years ago

SCImago Team

Dear Vani,
Thank you for contacting us.
As said below, we calculate the SJR data for all the publication's types, but the Quartile's data are only calculated for Journals and Book Series.
Best regards, SCImago Team



FEROSKHAN M 2 years ago

IOP Conference Series: Earth and Environmental Science - Volume 573 is not available in Scopus. But later volumes are available. May I know when will they publish in Scopus?

← reply



Melanie Ortiz 2 years ago

SCImago Team

Dear Sir/Madam,
thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you contact Scopus support:
https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/scopus/
Best Regards, SCImago Team



Natt 2 years ago

I would like to know the quartile of this journal. Why isn't it showing on the website?

← reply



Melanie Ortiz 2 years ago

SCImago Team

Dear Natt,
Thank you for contacting us. We calculate the SJR data for all the publication's types, but the Quartile's data are only calculated for Journals and Book Series.
Best regards, SCImago Team



Nurgustaana 3 years ago

Dear SCImago Team!

I want to know previous quartiles of journal (for 2018 and 2019 years). I have tried find information about a quartile, but discovered just SJR for 2018. Could you please provide information about it?

Yours sincerely, Nurgustaana

← reply



Melanie Ortiz 3 years ago

SCImago Team

Dear Nurgustaana,

Thank you for contacting us. We calculate the SJR data for all the publication types, but the Quartile data are only calculated for Journal type's publications. Best regards,
SCImago Team



Mora 3 years ago

hello, how to search one of journal who published by IOP, because when i find it by the title, they are not able in scimagojr but the publisher is available in here, thank you for the respond it means a lot

← reply



Melanie Ortiz 3 years ago

SCImago Team

Dear Mora,

thank you for contacting us. Could you provide us the Title of the journal? We remember that SCImago Journal & Country Rank shows all the information have been provided by Scopus. If you didn't localize the journal in the search engine, it means that Scopus / Elsevier has not provided us the corresponding data.

Best Regards, SCImago Team



Dr. Yousif 3 years ago

Dear Sir,

I have published a paper in Earth and Environmental Science Journal (only myself, single author) I am trying to withdraw it after 28 days of publishing online, is it possible? Could you please tell me the procedure of withdrawing a paper?

Thank you,

← reply



Melanie Ortiz 3 years ago

SCImago Team

Dear Yousif,
thank you for contacting us.
We are sorry to tell you that SCImago Journal & Country Rank is not a journal. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus.
Unfortunately, we cannot help you with your request, we suggest you to contact the journal's editorial staff , so they could inform you more deeply. Best Regards, SCImago Team



Agustinus Kastanya 3 years ago

need information about renking of the Journal on Scopus

← reply



Melanie Ortiz 3 years ago

SCImago Team

Dear Agustinus, thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you to consult the Scopus database directly. Remember that the SJR is a static image of a database (Scopus) which is changing every day. Best regards, SCImago Team



Mahipal 3 years ago

Dear Admin,

How could our journal include in your IOP?

← reply



Melanie Ortiz 3 years ago

SCImago Team

Dear Mahipal,
thank you for contacting us.
We suggest you to contact the IOP's editorial staff , so they could inform you more deeply.
If you would like to make an application to Scopus, please contact them to help you with this issue here: <https://www.elsevier.com/solutions/scopus/content/content-policy-and-selection>
<http://suggestor.step.scopus.com/suggestTitle/step1.cfm>
Best Regards, SCImago Team



Mursalin 3 years ago

Dear SCImago Team

My name is mursalin from Jambi City, Indonesia. I have published my article titled The Effect of Temperature on MDAG Purification Using Creaming Demulsification Technique at the IOP Conference Series: Earth and Environmental Science, Volume 309, conference 1 and could be accessed at: <https://iopscience.iop.org/article/10.1088/1755-1315/309/1/012068>. But why until now it does not appear into Google Scholar and my account.

Please help me to resolve the issue. Thank you for your kindness. I am waiting for good news from you.

Sincerely,
Mursalin

← reply



Melanie Ortiz 3 years ago

SCImago Team

Dear Mursalin,

Thank you for contacting us. Unfortunately, we can not help you with your request. Maybe other users can help you. Best Regards, SCImago Team



Танзиля Созаева 3 years ago

Доброго времени суток! Интересует информация по квартилю журнала (издания)

← reply



Melanie Ortiz 3 years ago

SCImago Team

Dear user, thank you very much for your request. You can consult that information in SJR website. Best Regards, SCImago Team



syaiful 4 years ago

I am very interested to send my paper to this conference

best regards

syaiful

← reply



Elena Corera 4 years ago

SCImago Team

Dear user, in the link below you will find the information corresponding to the author's instructions of this journal. Best regards, SCImago Team

<https://publishingsupport.iopscience.iop.org/author-guidelines-for-conference-proceedings/>

Leave a comment

Name

Email

(will not be published)



I'm not a robot

reCAPTCHA
Privacy - Terms

Submit

The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.

Developed by:

Powered by:



Follow us on @ScimagoJR

Scimago Lab, Copyright 2007-2022. Data Source: Scopus®

EST MODUS IN REBUS

Horatio (Satire 1, 1, 106)

[Edit Cookie Consent](#)

PAPER • OPEN ACCESS

Conceptual framework for the development of West Java Zero Waste Management Index

To cite this article: E J Sundana *et al* 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **794** 012050

View the [article online](#) for updates and enhancements.

You may also like

- [Planning of Waste Management using Zero Waste Approach at SMAN 14 Bandung, Indonesia](#)
R M Tariska, I Juwana and A D Sutadian
- [Trial performance of the zero waste harvesting method in three forest concession companies, Central Kalimantan Province, Indonesia](#)
Dulsalam, Soenarno and Sukadaryati
- [Application of make/use platform for sustainable fashion design](#)
A Scerbaka



The Electrochemical Society
Advancing solid state & electrochemical science & technology

242nd ECS Meeting

Oct 9 – 13, 2022 • Atlanta, GA, US

Abstract submission deadline: **April 8, 2022**

Connect. Engage. Champion. Empower. Accelerate.

MOVE SCIENCE FORWARD



Submit your abstract



Conceptual framework for the development of West Java Zero Waste Management Index

E J Sundana¹, A D Sutadian¹ and I Juwana²

¹Research and Development Agency of West Java Province (BP2D Jawa Barat), Bandung, Indonesia

²Department of Environmental Engineering, Institut Teknologi Nasional (ITENAS), Bandung, Indonesia

Corresponding author: eka.sundana@jabarprov.go.id

Abstract. Over the past decade, zero waste emerged as one of the promising concepts for waste management. Many parties have introduced this concept as a new way of waste management, aiming to reduce as little amount of waste generated as possible and send nothing to landfills. To measure the success of the zero waste implementation, some set of indicators have been developed. Although these were claimed to be successful after their implementation, very often they are not applicable to other regions or countries. Therefore, this study recommends developing the Zero Waste Management Index, which fits with local or regional conditions. This paper will discuss a framework for developing the West Java Zero Waste Management Index (WJZWMI). It will outline urban solid waste problem in West Java, and a brief review of existing zero waste indexes. Further, it will emphasize on the conceptual framework of the WJZWMI, which then results in potential long list indicators as preliminary results of this study, while also charting pathways for future works in developing a comprehensive zero waste management index for West Java Province.

Keyword: framework, development, zero waste, management index

1. Introduction

Urban solid waste has emerged as a serious global problem. Managing it requires not only technical measures, but also complex and multi-disciplinary approaches. Without proper management, global solid waste generation will increase by 70% from 2.1 million tonnes in 2016 to 3.4 million tonnes in 2050 [1]. In developing countries - where urbanization rate and population growth are high, while financing capacity is limited – solid waste management services often failed to be delivered reliably and efficiently [2]. West Java, as the most populated and urbanized province in Indonesia, is also facing this serious problem, as waste generation is increasing but the availability of land to be used as final disposal site is extremely limited [3]. Therefore, solid waste management effort that is heavily focused on ‘collect-transport-disposal’ (or known as ‘end-of-pipe’ approach) must be shifted to an approach that aims to reduce waste generation from the source (or known as ‘up-the-pipe’ approach), in order to reduce the burden of overall solid waste management cost [4].

Zero waste concept is an emerging and a promising solid waste management approach for urban areas. In the past few years, many cities have introduced the concept as a new way or paradigm in managing solid waste as an effort to reduce waste generation from the source, and in turn, reduce the volume of waste being sent to final disposal site (landfill). In fact, the goal of zero waste concept is to



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

“send nothing to the landfill” [5]. Zaman dan Lehmann [6] further defined zero waste as a comprehensive solid waste management concept which treats waste as a form of inefficiencies from the activities of modern society. They further elaborate that zero waste concept transforms the conventional definition of waste as something useless to useful resources in a sustainable consumption cycle. In Indonesia, zero waste concept has been adopted by The Solid Waste Management Law No. 18/2008, and then further elaborated by the Presidential Decree No. 97 Year 2017 concerning The National Policy and Strategies for Municipal Solid Waste Management, which focused on two main approaches: (1) waste reduction and (2) waste handling. The Decree has defined a national target of 30% waste reduction to be achieved in 2025. However, in order to be properly implemented by local governments, it is urgent to develop appropriate performance indicators that can be measured simply, interpreted easily, while also accessible and reliable for monitoring waste reduction [7]. Further, the combination of complex solid waste management indicators can be represented by an index, which is an aggregate measure that can be useful in describing the problems in a simplified manner and thus help in focusing on key issues [8]. An assessment of a host of aspects is allowed by such approach, which can then be translated into a single comparable index [9].

This paper will discuss a framework for developing the West Java Zero Waste Management Index (WJZWMI). It will outline urban solid waste problem in West Java and conduct a brief review of existing zero waste indexes. Further, it will emphasize on the conceptual framework of the WJZWMI, which then results in potential long list indicators as preliminary results of this study, while also charting pathways for future works in developing a comprehensive zero waste management index for West Java Province.

2. Solid Waste Problem in West Java Province

West Java, with almost 50 million inhabitants, is the largest populated province in Indonesia. With the ever increasing population growth, solid waste management problem becomes an increasingly crucial issue. Based on the latest report, West Java generates almost 27.5 tonnes of municipal solid waste per day [3]. The report also explained that current practices of solid waste management still focus on waste collection, transportation, and dump system, which relies heavily on the availability of land for final disposal sites (known as tempat pembuangan akhir sampah or TPAS). Herein lies the problem, as based on the latest study in determining the suitability of land in West Java, most areas are deemed to be not suitable to be used as TPAS. The study, carried out by analyzing the physical parameters that refer to the Standard Procedure for The Selection of Final Waste Disposal Site (SK SNI 17-11-1991-03), is presented into a map as illustrated below.



Figure 1. Land suitability for final waste disposal site in West Java [3]

With the increasing waste generation, with limited level of service, and also with the increasingly limited availability of suitable land to be used as landfills, it is clear that different approach is needed in ensuring the sustainability of waste management in West Java, which not only focuses on final disposal, but also on substantial efforts to reduce waste at its source. To address this issue, the Government of West Java has issued Provincial Regulation No. 1 Year 2016 and then further detailed into waste management policy and strategies (JAKSTRADA) document published in 2018. However, an objective and reliable performance evaluation tool, such as zero waste management index, is urgently needed especially in West Java's effort to reduce the volume of waste being dumped into landfills [3].

3. Existing Zero Waste Index

From global academic journal articles published between 2010 and 2019, there are three indexes that had been developed based on zero waste concept. Unlike other environmental indexes, these Zero Waste indexes do not share common structure and do not involve the opinions of local stakeholders. Even so, the components or indicators used tend to differ greatly from one another, depending on which aspect to focus on. For example, the Zero Waste Index [6] focuses on the efficiency of replacing virgin material from a type of waste that can be avoided, reduced or reused. Meanwhile, the Waste Diversion Rate focuses on the end point of the waste journey by only quantifying the amount of waste sent to the landfill and the amount of waste recycled globally.

Table 1 shows the three indexes that have been developed related to the concept of Zero Waste, its advantages and disadvantages, and the opportunities for its application in West Java Province. Of the three indexes studied, the Waste Diversion Rate is the most commonly adopted index globally in measuring the performance of Zero Waste-based waste management. However, the indicators used in the Waste Diversion Rate do not inform how efficiently virgin material can be saved in a solid waste management system. This lack of information was attempted to be rectified through the development of the Zero Waste Index [6] [10] [11], which mostly focus on environmental conservation. Likewise with the Zero Waste Hierarchy Index, there is no indicator in the index that represents the economic, environmental, financial, or regulatory side of the existing management system. For example, there is no single index that has adopted the targets/goals defined in the Sustainable Development Goals (SDGs), which have become a global guide for all countries in the world in order to apply the principles of holistic sustainable development. A study from Rodić and Wilson [12] has concluded that solid waste management is an overlapping issue that connects 12 out of 17 SDGs. Therefore, a series of indicators is needed that can reflect the condition of managing zero waste as a whole. Furthermore, in the context of data quality and availability, it is difficult for these three indexes to be applied in West Java because the data needed so far are not readily available.

Table 1. Existing indexes related to zero waste

1. WASTE DIVERSION RATE

$$\text{Diversion rate} = \frac{\text{Weight of recyclables}}{\text{Weight of garbage} + \text{Weight of recyclables}} \times 100\%$$

Weight of recyclables: amount of waste to be recycled

Weight of garbage: amount of waste disposed to landfill or incinerator

Objective	Reference(s)	Advantage	Disadvantage	Opportunity for application in WJ
Represents the amount of waste that is successfully managed through recycling and not disposed of in the landfill	Not available, but this tool has been applied in many countries	<ul style="list-style-type: none"> Applied globally; Simple and easy to be applied. 	<ul style="list-style-type: none"> Only informing the amount of waste being managed in landfill; Other indicators related with economic, legal, environmental, etc. are not covered. 	<ul style="list-style-type: none"> Difficult to be applied as data on recycled waste are not yet recorded properly

2. ZERO WASTE INDEX

$$\text{Zero waste index} = \frac{\sum \text{potential amount of waste managed by the city + substitution for the system}}{\text{Total amount of waste generated in the city}}$$

Potential amount of waste managed by the city: Amount of waste being managed by a city

Substitution for the system: virgin material successfully reused

Total amount of waste generated in the city: Amount of waste generated by a city

Objective	Reference(s)	Advantage	Disadvantage	Opportunity for application in WJ
To measure the sustainability of solid waste management system from environmental perspective.	[6][10][11]	<ul style="list-style-type: none"> Already applied in Adelaide (Australia), Stockholm (Sweden) and San Francisco (USA); It considers conservation efforts through reused virgin materials, energy and water use, and greenhouse gas (GHGs) emission. 	<ul style="list-style-type: none"> Relies heavily on the quality of available data; Other indicators related with economic, legal, institutional, etc. are not covered; Focusing only on technical aspect; Does not involve local stakeholders in the development of the index. 	<ul style="list-style-type: none"> Difficult to be applied in West Java, as the data from every stage of solid waste operation which has circular economy potential are not readily available; Difficult to be used for program prioritization.

3. WASTE HIERARCHY INDEKS

$$WHI = \frac{[(1((PR + UpR + RR + CAD) + aDR + bBT + cWtE)) + (-1((1 - a)DR + (1 - b)BT + (1 - c)WtE + I + L))]}{\text{Total waste treated}}$$

PR: Preparing for reuse

UpR: Upcycling

RR: Re-recycling

CAD: Composting and anaerobic digestion

DR: Down-cycling

BT: Biological treatment

WtE: Waste to energy

I: Incineration without energy recovery

L: Landfill

a, b, c: level of contribution (0 – 1)

Objective	Reference(s)	Advantage	Disadvantage	Opportunity for application in WJ
Represents various stages of solid waste management operation based on circular economy	[13]	<ul style="list-style-type: none"> Provides a comprehensive tool to evaluate technical aspect of solid waste management; Accurate calculation as it considers the whole process of solid waste management operation based on circular economy. 	<ul style="list-style-type: none"> Complex and requires technical data from every type of waste process handling; Not yet adapted as a formal management tool; Other indicators related with economic, legal, institutional, etc. are not covered; Focusing only on technical aspect. 	<ul style="list-style-type: none"> Difficult to be applied in West Java, as the data from every stage of solid waste operation which has circular economy potential are not readily available; Difficult to be used for program prioritization.

Therefore, a Zero Waste Management Index which is specifically developed through the involvement of local level stakeholders and based on the natural conditions and socio-economic characteristics of West Java Province, is very much needed to improve the governance of waste management in West Java. The index will not only help obtain information on the current conditions of West Java solid waste management in implementing the zero waste concept, but can

also become a tool to prioritize existing solid waste issues. The next part will present the proposed conceptual framework for WJZWMI.

4. Proposed conceptual framework

The conceptual framework proposed describes the relationship between the theory underlying and methods/approaches applied in this study, as presented in Figure 2. Steps in the development of an index generally consist of theoretical framework, indicator selection, normalization, weighting and aggregation, and interpretation. In addition, robustness analysis is done to investigate uncertainty attached in an index. To start with, a sound theoretical framework is the starting point in developing a composite index [14]. This research's goal focuses on reliable performance measurements for the implementation of zero waste management in West Java. As for this, the definition of zero waste, used in this study, refers to the Zero Waste International Alliance's [5]: "*The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health*".

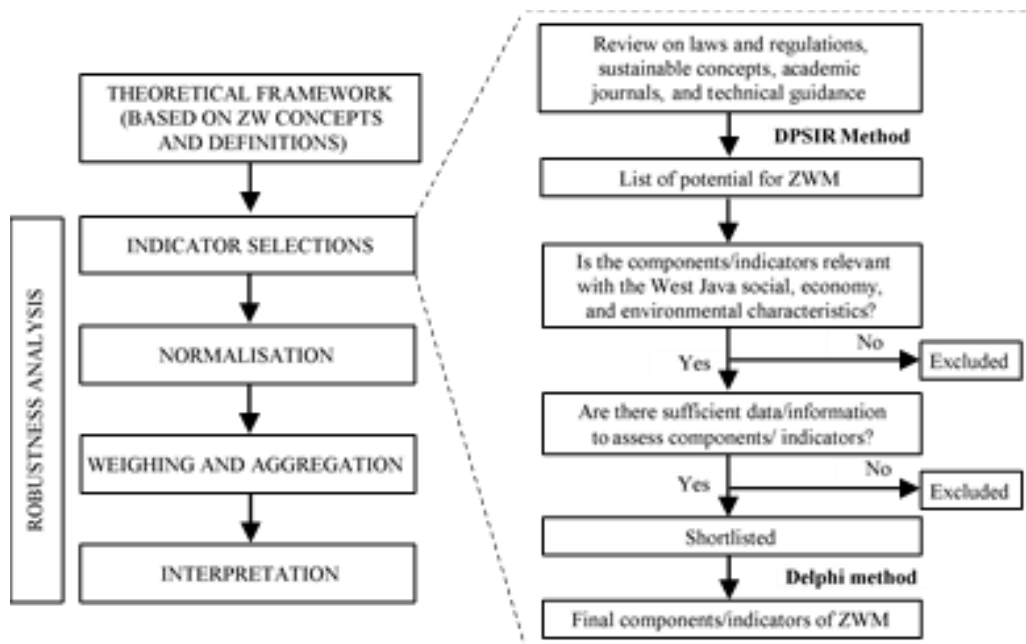


Figure 2. The proposed conceptual framework of WJZWMI

By far, it is a globally accepted definition and it implies that every stage in waste management strives systematically to avoid and eliminate waste generation, conserve and recover all resources, and avoid to burn or bury them. Thus, sanitary landfill and waste to energy, even though both meet sustainable development principles, the two are not included as zero waste activities. As a consequence, in this study, WJZWMI will be developed through redesign, reuse, recycle and recovery principles.

In line with the above definition, the conceptual framework also considers Law No. 18/2008 regarding Waste Management in Indonesia as a fundamental notion. Furthermore, Government Regulation No. 97/2017 regarding National Policy and Strategy of Municipal and Non-Municipal Waste Management that emphasize on two main strategies, namely (1) 30% reduction and (2) 70% treatment being directions for this development index is studied.

It is worthy to note that to obtain list of potential components and indicators (long listed), available waste indicators discussed in academic journals and technical guidance of waste management, are collected and considered to be used in the next steps in the development of WJZWMI. Therefore, the

accuracy of WJZWMI largely depends on a series of indicators that reflect the actual state of zero waste management across the province.

Two main criteria for identification of components and indicators are used. The first criterion was the suitability and the relevancy to the west java development with respect to the sustainable development of West Java (i.e. environmental, economic, social backgrounds). The second criterion was related to data availability of respective indicators for use in the case studies.

In general, the selected indicators are expected to be able to measure key performance indicators of zero waste management across the province. These can be either qualitative or quantitative forms over the facts of zero waste implementation. A few indicators in the WJWMI can be grouped as one components having similarities, or specific indicators can be merged as sub-indicators.

The selection of indicators can be a subjective process since there is no agreement among index developers regarding both the best method and approach used. Therefore, to eliminate subjectivity of the indicators selection, two additional methods are applied, namely the Driver-Pressure-State-Impact-Response (DPSIR) and the Delphi. The DPSIR is aimed at obtaining interaction among environmental, social and economic side [15]. Moreover, the DPSIR is used to describe the interlinked relationship between indicators and highlights the indicators which are needed to enable feedback on the resulting impact of current and future policy choices [16]. The latter is used to gain experts or related stakeholders 'opinions in finalizing selected components, indicators, and their thresholds for the development a composite index [17]. Considering all available concepts and guidelines on zero waste management, a conceptual framework for West Java Zero Waste Management index was developed.

5. Preliminary results

The preliminary results only discuss two steps in the development of the WJZWMI, namely the theoretical framework (presented earlier in Section 4) and two sub-steps of indicators selection. In the 2 sub-steps of indicators selection, related academic journals possessing highly cited in the period of 2012 – 2019, local regulations, and formal technical guidance were studied. Each indicator in those articles/documents/websites were collected and grouped using the DPSIR method. There are 168 indicators based on this extensive literature review, as presented in Table 2 Column 1 presents summarized long listed indicators using the DPSIR method and Column 2 shows scope of study and its references. While D/P stands for driving force/pressure, S/I is state/impact, and R is response. Important indicators of zero waste can in general be classified as response indicators mostly. These important indicators are reduction activities prior to final or treatment processes. This indicates that either experts or decision makers provided policy and strategy to respond undesirable impacts based upon specific locations. The long listed indicators as presented in Table 2 addressed the importance of material flows clearly toward zero waste management as well as waste recovery being raw material for an input of previous stages of waste management cycle. In addition, even though landfill and waste to energy are excluded as zero waste activities, a few indicators are still used. Nevertheless, they are specifically considered as “negative factors” in the implementation of zero waste management.

Table 2. Potential long listed indicators

List of indicators	References
D/P PDRB, types of city, waste generation, waste characteristic, coverage area, volume of waste. S/I Landfill capacity, location of area. R Segregation, container, collection, transportation, number of truck, number of temporary station, formal and informal activities, waste bank, number of employee, facility of waste treatment.	Guidelines of regional SWM Scale: Provincial MSW
R Decreased of waste sent to landfill, decreased of waste generation treated in landfill, decreased of MSW, decreased of waste generation	Guidelines of local SWM Scale: City or regency MSW

	per capita, number of recycling at sources, number of reuse at sources, increased of waste generation segregated at sources, increased of waste to raw materials or energy, increased of number of waste processed to raw materials, increased of number of waste processed to energy.	
D/P	Manufacturing, resource extraction and processing, consumption and waste generation, waste disposal.	[18] Scale: Global MSW
R	Product design, waste management, regulatory policy.	
D/P	Population, waste generated (ton), per capita waste generated (kg/cap), and per capita landfilled (kg/person).	[10] Scale: Australia MSW
S/I	Waste diversion rate (%), per capita diversion rate (kg/cap).	
R	Waste composted (ton), waste recycled (ton), waste diverted (ton), and waste landfilled (ton), recycling (ton), compost (ton), and landfilled (ton).	
D/P	Municipal waste generation (kg/day or m ³ /day or ton/year), hazardous waste generation (kg/day or m ³ /day), food waste generation (kg/day or m ³ /day), construction and demolition waste generation (kg/day or m ³ /day), amount of waste of electrical and electronic equipment (kg/day or m ³ /day)	[15] Scale: European MSW
S/I	Number/ percentage of schools have implemented concept on waste (qty/%)	
R	Waste Prevention by reuse packaging (kg), waste prevention by reuse electronic equipment (kg), approach general waste prevention (kg), number/percentage of municipalities (qty), funding provided for waste prevention, number/percentage municipal statutes obliging, number of activities as part of the European week for waste reduction, facilities for the sale or exchange second goods, number of repair network of business, number of business conduct concerning resource material efficiency	
R	Institutional, institutional structure, human resources, job desk, financing, capital, partnership, socialization, promotion, city waste bank integration, operational executor, collection, management, waste type, waste pick up, price fixing, operational time, monitoring, assessment, self-protection kits, work health and safety, waste bank client, community service, public facility, operational facility, building facility.	[19] Scale: City MSW
D/P	Population, income level (classified, \$/cap), waste generation (Kg/Cap/day), municipal waste types (tonnes/year).	[20] Scale: Global MSW
S/I	Landfilled (%), incinerated (%), energy savings (GJHV/years), greenhouse gas (Kg/year), water (L/year).	
R	Recycled (tonnes), composted (tonnes), material substitution tonnes, material recovery (Tonnes).	
D/P	Material Use (ton/years), waste generation (ton/year), GHG from incinerator (%) (tCO ₂), GHG from landfill (%) (tCO ₂), carbon (tCO ₂)	[21] Scale: Northern Spain
S/I	Carbon increase (tCO ₂), health (qty), and climate change.	
R	MSW reduce (ton/year), recycling Rate (%).	
D/P	Industrial (Qty), e- waste generated (ton/years), transboundary movements (ton/years).	[22] Scale: Global SWM
S/I	Environmental quality (quality standards).	
R	Eco design (Qty), eco labelling (Qty), closed loop chain (Qty).	
D/P	Geo administrative area (km ²), population in service area, No. of buildings (housing, inst., etc) (Qty), length of road network, household's purchase capacity, household expenditures, food consumption, resource consumption, consumption expenditure, economic cost, revenue, net cost benefit, waste properties (density, moisture cont, & chemical comp.), waste stream (household, C&I, C&D) (m ³ /day), illegal dumping, environmental emissions (mg/L), amount of Waste (Qty), no. of employees (tonne)	[23] Scale: Global MSW

<p>S/I Lifespan of landfill (year), diversion rate (%), net env. Burden/ benefit, no. accident in waste management (cases/ people), no. of health/disease related to waste (cases/ people)</p> <p>R Area covered by waste service (m²), types of Waste (MSW, C&I, C&D, e-waste, hard waste), avoidance programme, item exchanged/ resell (qty or kg), item reused (qty or kg), no. of bins, types of bins, size of the bins (cm³), types of waste collected separately (bin), frequency of collection (times/ day or per week), collected in formal/ informal, accessibility of recycling deport to public, recycled/cap, recycling efficiency, formal/informal recycling, materials processed in different facilities (kg), materials recovery (kg), sorting efficiency, controlled disposal, deposal/cap, environmental savings, waste management, H&S equipment for workers (person or people), central waste data, time series data, waste forecasting, regulatory scheme and program (CP, EPR), regulatory laws and rules (ban, restriction), incentives (tax, incentives), degree of public satisfaction (%), auditing and monitoring, export of waste (kg or tonnes or m³), import of waste (kg or tonnes or m³)</p>	
<p>D/P Per capita GDP, per capita economic benefits (\$/person/year), per capita waste generation (kg).</p> <p>R Per capita waste recycle (kg), per capita virgin material substitution (kg), amount of waste stream i managed by system j (tonnes), substitution factor for the amount of waste stream I managed by system j (tonnes), amount of waste avoided, recycled, treated, etc.) (tonnes).</p>	<p>[11] Scale: Global MSW</p>
<p>R Preparing for reuse (waste mass wet basis), upcycling (waste mass wet basis), re-recycling (waste mass wet basis), composting and anaerobic digestion from source separation (waste mass wet basis), biological treatment of mixed/residual MSW (waste mass wet basis), waste to Energy (WtE) (waste mass wet basis), incineration without energy recovery (waste mass wet basis), landfill (waste mass wet basis), level of downcycling to the circular economy (CE), contribution level of biological treatment to CE, contribution level of WtE to the CE.</p>	<p>[13] Scale: MSW Portugal</p>

This preliminary results also reveals that the long listed of key performance indicators are influenced by technical, institutional, community participation, regulation, and as well as regulation, in which zero waste management concepts and implantations can be also adopted in different scales, from city up to a country or continent. It is important to note that identification of existing solid waste management is needed to provide “benchmark” to evaluate the efficiency towards zero waste management. According to “this benchmark” policy intervention can be implemented using the selected indicators.

Taking account of the directions from policy and strategy of MSW mandated per regulation in each city across the province, namely 30% reduction and 70% treatment activities are a must. Thus, these two targets should be selected as mandatory indicators in the development of WJZWMI in the future.

6. Future works

This paper presented the proposed conceptual framework the development of WJZWMI for West Java. Having completing the literature review and long listed of potential indicators based upon the DPSIR method using two criteria namely the suitability of the proposed components and/or indicators with the relevancy to sustainable development aspects and data availability, the preliminary results will be refined using the Delphi method in several case studies across the province. The application of the Delphi method aims at obtaining and consensus and eliminating subjectivity among stakeholders on the selected indicators. The Delphi will be also used to identify and define respective indicator threshold values. After the finalisation of the components, indicators and threshold values, the method to aggregate the selected components and indicators will also be determined.

With respect to the case studies, the applications of the Delphi method and the WJZWMI will be done in nine cities across the province, as this study will be focused on urban areas. The nine cities are selected as those have more comprehensive data. In addition, these cities produce mixed compositions of waste generation compared to those in rural areas.

The case studies conducted in nine cities, will start with data collection of the finalized set of components, indicators and threshold values. Using all relevant data collected from previous studies, formal databases and other related sources, the WJWMI will be applied for each area. One of the outcomes from these nine case studies is the prioritization of zero waste issues across the province, which will be the basis for recommendation for related authorities to improve their zero waste management in respective case study areas.

Finally, based upon input uncertainties, robustness analysis of the WJWMI will be undertaken through the inclusion or exclusion of components and indicators, the selections of threshold values, the normalization and the aggregation methods. The identified sources of uncertainty will be analysed through the sensitivity analysis to accurately point out how these different input assumptions affect the outputs. By taking account of this, uncertainties attached to WJZWMI in its development will be significantly reduced. Results of the robustness analysis will be used to finalize the outcomes of the case studies, so that recommendations can be conveyed confidently to the respective authorities in addressing zero waste issues within case study areas.

Acknowledgments

The first and second authors wish to thank BP2D, which funded this research through Grant No. 070/Kep.51/BP2D/2019. All authors contributed equally for all sections in this manuscript.

References

- [1] The World Bank 2018 Press release NO: 2018/037/SURR Available at: <https://www.worldbank.org/en/news/press-release/2018/09/20/global-waste-to-grow-by-70-percent-by-2050-unless-urgent-action-is-taken-world-bank-report>
- [2] Wilson D C, Velis C, Cheeseman C 2006 Role of informal sector recycling in waste management in developing countries. *Habitat International* 30 797–808
- [3] WJ-EPA 2018 Environmental Protection and Management Plan Document (RPPLH) 2017 – 2047 (Bandung: WJ-EPA)
- [4] Damanhuri E 2005 Some Principal Issues On Municipal Solid Waste Management In Indonesia Expert Meeting on Solid Waste Management in Asia-Pacific Islands (Tokyo: SWAPI)
- [5] ZWIA 2004 Zero waste definition Available at: <http://zwia.org/zero-waste-definition/>
- [6] Zaman A U, Lehmann S 2013 The zero-waste index: a performance measurement tool for waste management systems in a ‘zero waste city’ *Journal of Cleaner Production* 50 123-132
- [7] Sanjeevi V, Shahabudeen P 2015 Development of performance indicators for municipal solid waste management (PIMS): a review *Waste Management & Research* 33(12) 1-14
- [8] Atkinson G D, Dubourg, Hamilton R K, Munasigne M, Pearce, D W, Young C 1997 *Measuring Sustainable Development: Macroeconomics and the Environment* (Cheltenham: Edward Elgar)
- [9] Elsadig H, Yassin K E E, Elseory, M 2016 Development of composite performance index for solid waste management *IOSR Journal of Environmental Science, Toxicology and Food Technology* 10 (4) 83-90
- [10] Zaman A U 2014 Measuring waste management performance using the ‘Zero Waste Index’: the case of Adelaide, Australia *Journal of Cleaner Production* 66 407-419
- [11] Zaman A U, Swapan M S H 2016 Performance evaluation and benchmarking of global waste management systems *Resources, Conservation and Recycling* 114 32-41
- [12] Rodić L, Wilson D C 2017 Resolving Governance Issues to Achieve Priority Sustainable Development Goals Related to Solid Waste Management in Developing Countries.

- Sustainability (9) 404
- [13] Pires A, Martinho G 2019 Waste hierarchy index for circular economy in waste management Waste Management 95 298-305.
 - [14] OECD 2008. Handbook on Constructing Composite Indicators: methodology and user guide (France: OECD Publishing)
 - [15] Wilts H, Meinel U, Schinkel J, Feder L 2019 Research study on holistic indicators for waste prevention (Wuppertal: Zero Waste Europe) Available at: <https://zerowasteurope.eu/downloads/research-study-on-holistic-indicators-for-waste-prevention/>
 - [16] Kristensen P 2004 The DPSIR framework (Denmark: National Environmental Research Institute) p 10
 - [17] Han S F, Zhu R F, Cheng J L, Cao Y 2017. Construction of an evaluation index system for the innovativeness of nursing papers using the Delphi method Chinese Nursing Research 4 (3) 151-154
 - [18] Zaman A U 2014 A comprehensive review of the development of zero waste management : lessons learned and guidelines Journal of Cleaner Production 91 12-25
 - [19] Pranaditya M, Juwana I 2019 Re-development of a city-scale waste bank assessment index: Case studies Bandung and Cimahi Cities IOP Conf. Ser.: Earth Environ. Sci. 277(1) 012013
 - [20] Zaman A U 2016 A comprehensive study of the environmental and economic benefits of resource recovery from global waste management systems Journal of cleaner production 124 41-50
 - [21] Cifrian E, Galan B, Andres A, and Viguri, J R 2012 Material flow indicators and carbon footprint for MSW management systems: Analysis and application at regional level, Cantabria, Spain Resources, Conservation and Recycling 68 54-66
 - [22] Song Q, Li J, and Zeng X 2015 Minimizing the increasing solid waste through zero waste strategy Journal of Cleaner Production 104 199-210
 - [23] Zaman A U 2014 Identification of key assessment indicators of the zero waste management systems Ecological Indicators 36 682-693



ICEED 2020

CERTIFICATE

THIS CERTIFICATE IS GRANTED TO

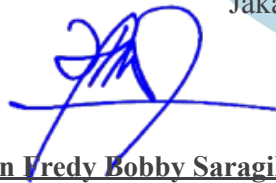
Eka Jatnika Sundana

In Recognition as

PRESENTER

in **The 4th International Conference on Eco Engineering Development (ICEED)**,
“Eco Engineering, Technology, Planning and Design for Sustainable Living and Environment.”

Jakarta, 10th and 11th November 2020



Dr. Ir. John Fredy Bobby Saragih, M.Si.
General Chair of ICEED 2020



Religiana Hendarti, S.T., M.T., Ph.D.
Conference Chair of ICEED 2020





Conceptual Framework for the Development of West Java Zero Waste Management Index (WJZWMI)

EJ Sundana, A D Sutadian, I Juwana



ICEED 2020

*Presented in the 4th International Conference
on Eco Engineering Development (ICEED) 2020
10-11 November 2020*

