BUKTI KORESPONDENSI

PUBLIKASI PADA JURNAL INTERNASIONAL BEREPUTASI

MANAGEMENT OF ENVIRONMENTAL QUALITY

https://doi.org/10.1108/MEQ-02-2022-0034

ISSN: 1477-7835

JUDUL: What are the factors that determine differing levels of environmental quality? Evidence from Java and other islands in Indonesia

Ringkasan Korespondensi

Session with Prof. Malin Song, Dipti C., and Karthik S.			
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - Account Created in Manuscript Central

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Fri, Feb 18, 2022 at 8:02 AM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id

17-Feb-2022

Dear Dr. Pujiati:
Welcome to the Management of Environmental Quality - Manuscript Central site for online submission and review.

Your USER ID and PASSWORD for your account at https://mc.manuscriptcentral.com/meq is as follows:

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PASSWORD: If you are unsure of the password that you set when you created your account you should click the link below which will take you directly to the option for setting a new password.

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Thank you for your participation.

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Management of Environmental Quality Editorial Office
Log in to Remove This Account - https://mc.manuscriptcentral.com/meq?URL_MASK=4e8ad0535fc746aabf516dd7c7be68d3

Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - MEQ-02-2022-0034

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Fri, Feb 18, 2022 at 8:23 AM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id

17-Feb-2022

Dear Dr. Pujiati:

Firstly, we'd like to say thank you for submitting your manuscript entitled "What Are the Factors that Differentiate Environmental Quality? Evidence from the Island of Java and Non-Java in Indonesia" for publication consideration in Management of Environmental Quality, published by Emerald.

Your manuscript ID is MEQ-02-2022-0034, so please include this number in all future correspondence.

If your manuscript complies with the journal's Editorial Scope (http://emeraldgrouppublishing.com/products/journals/journals.htm?id=meq) and Manuscript Guidelines (http://emeraldgrouppublishing.com/products/journals/author_guidelines.htm?id=meq), it will be double-blind peer reviewed, a process normally takes 2-3 months (depending on reviewer availability), after which we will contact you again. If your paper does not satisfy the journal's Editorial Scope or Manuscript Guidelines, we will contact you sooner.

We respectfully remind you that whilst your manuscript/paper is under consideration for publication in Management of Environmental Quality, submission of this work to other publications is not permitted.

Please remember to update your user information at ScholarOne Author Centre (https://mc.manuscriptcentral.com/meq) if anything changes. You can also view the progress of your manuscript in the Submitted Manuscripts section.

We would like to thank you once more for your submission with Emerald and shall contact you again as soon as the review process has been completed.

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Thank you for submitting your manuscript to the Management of Environmental Quality.

Sincerely,
Malin Song
Management of Environmental Quality Editorial Office

https://orcid.org/0000-0002-3694-9846

Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - Author update

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Sun, Feb 20, 2022 at 9:16 AM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id

19-Feb-2022
Dear Author(s)
It is a pleasure to inform you that your manuscript titled What Are the Factors that Differentiate Environmental Quality? Evidence from the Island of Java and Non-Java in Indonesia (MEQ-02-2022-0034) has passed initial screening and is now awaiting reviewer selection. The manuscript was submitted by Dr. Amin Pujiati with you listed as a co-author. As you are listed as a co-author please log in to https://mc.manuscriptcentral.com/meq and check that your account details are complete and correct, these details will be used should the paper be accepted for publication.
Yours sincerely,
Malin Song
Editorial Assistant, Management of Environmental Quality
songmartin@163.com

Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - Author update

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Sun, Feb 20, 2022 at 9:19 AM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id

19-Feb-2022

Dear Author(s),

It is a pleasure to inform you that all required reviews have been received for your manuscript entitled "What Are the Factors that Differentiate Environmental Quality? Evidence from the Island of Java and Non-Java in Indonesia" and that your paper is now awaiting an Editor Decision.

[Quoted text hidden]

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - Decision on Manuscript ID MEQ-02-2022-0034

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Mon, May 16, 2022 at 8:22 AM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id

15-May-2022

Dear Dr. Pujiati:

Manuscript ID MEQ-02-2022-0034 entitled "What Are the Factors that Differentiate Environmental Quality? Evidence from the Island of Java and Non-Java in Indonesia" which you submitted to the Management of Environmental Quality, has been reviewed. The comments of the reviewer(s) are included at the bottom of this letter.

The reviewer(s) have recommended publication, but also suggest some revisions to your manuscript. Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript.

To help support you on your publishing journey we have partnered with Editage, a leading global science communication platform, to offer expert editorial support including language editing and translation.
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Once the revised manuscript is prepared, you can upload it and submit it through your Author Centre.

When submitting your revised manuscript, you will be able to respond to the comments made by the reviewer(s) in the space provided. You can use this space to document any changes you make to the original manuscript. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the reviewer(s).

IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.

Because we are trying to facilitate timely publication of manuscripts submitted to the Management of Environmental Quality, your revised manuscript should be uploaded as soon as possible. If it is not possible for you to submit your revision in a reasonable amount of time, we may have to consider your paper as a new submission.

Once again, thank you for submitting your manuscript to the Management of Environmental Quality and I look forward to receiving your revision.

Sincerely,
Prof. Malin Song
Associate Editor, Management of Environmental Quality
songmartin@163.com

Reviewer(s)' Comments to Author:
Reviewer: 1

Recommendation: Major Revision

Comments:
The paper is interesting and has novelty, but requires substantial revision.

Additional Questions:
1. Originality: Does the paper contain new and significant information adequate to justify publication?: It has originality since it attempts to compare Island of Java and Non Java.

I would suggest concentrating on the recent studies and below are the studies from which the author/authors can benefit:
Isiksal, A. Z. (2021). Testing the effect of sustainable energy and military expenses on environmental degradation: evidence from the states with the highest military expenses. Environmental Science and Pollution Research, 28(16), 20487-20498.

Isiksal, A. Z. (2022). The decline in carbon intensity: the role of financial expansion and hydro-energy. Environmental Science and Pollution Research, 29(11), 16460-16471.

Joof, F., and Isiksal, A. Z. (2021). Do Human Capital and Export Diversification Decline or Augment CO2 Emissions? Empirical Evidence from the MINT Countries. Journal of Environmental Accounting and Management

Isiksal, A. Z., Samour, A. and Resatoglu, N. G. (2019). Testing the impact of real interest rate, income, and energy consumption on Turkey's CO2 emissions.
Environmental Science and Pollution Research. 26(20): 20219–20231

2. Relationship to Literature: Does the paper demonstrate an adequate understanding of the relevant literature in the field and cite an appropriate range of literature sources? Is any significant work ignored?: There is no Abstract. There is no Literature Review.

3. Methodology: Is the paper's argument built on an appropriate base of theory, concepts or other ideas? Has the research or equivalent intellectual work on which the paper is based been well designed? Are the methods employed appropriate?: The methodology is appropriate.

4. Results: Are results presented clearly and analysed appropriately? Do the conclusions adequately tie together the other elements of the paper?: Results are clearly presented

5. Implications for research, practice and/or society: Does the paper identify clearly any implications for research, practice and/or society? Does the paper bridge the gap between theory and practice? How can the research be used in practice (economic and commercial impact), in teaching, to influence public policy, in research (contributing to the body of knowledge)? What is the impact upon society (influencing public attitudes, affecting quality of life)? Are these implications consistent with the findings and conclusions of the paper?: There is no policy implication part.

6. Quality of Communication: Does the paper clearly express its case, measured against the technical language of the fields and the expected knowledge of the journal's readership? Has attention been paid to the clarity of expression and readability, such as sentence structure, jargon use, acronyms, etc.: The paper clearly expresses the case.

Reviewer: 2

Recommendation: Major Revision

Comments:
The Paper seems original but similar studies have been conducted and few research works are available that have focused on sustainable development in Java and Non-Java Regions. Author/s need to elaborate what's the newness in this manuscript.

Methodology needs to be explained further. Author/s need to justify whether the used the best possible methods to conduct this research or they could have chose some other and better alternatives.

Contribution to scholarly literature needs to be emphasized further. Commercial and societal impact of the paper can be further revisited.

Additional Questions:
1. Originality: Does the paper contain new and significant information adequate to justify publication?: The Paper seems

original but similar studies have been conducted and few research works are available that have focused on sustainable development in Java and Non-Java Regions. Author/s need to elaborate what's the newness in this manuscript.

2. Relationship to Literature: Does the paper demonstrate an adequate understanding of the relevant literature in the field and cite an appropriate range of literature sources? Is any significant work ignored?: Literature review is appropriate. Recent and most relevant work has been cited in the manuscript.

3. Methodology: Is the paper's argument built on an appropriate base of theory, concepts or other ideas? Has the research or equivalent intellectual work on which the paper is based been well designed? Are the methods employed appropriate?: Methodology needs to be explained further. Author/s need to justify whether the used the best possible methods to conduct this research or they could have chose some other and better alternatives.

4. Results: Are results presented clearly and analysed appropriately? Do the conclusions adequately tie together the other elements of the paper?: Results are satisfactorily explained.

5. Implications for research, practice and/or society: Does the paper identify clearly any implications for research, practice and/or society? Does the paper bridge the gap between theory and practice? How can the research be used in practice (economic and commercial impact), in teaching, to influence public policy, in research (contributing to the body of knowledge)? What is the impact upon society (influencing public attitudes, affecting quality of life)? Are these implications consistent with the findings and conclusions of the paper?: Contribution to scholarly literature needs to be emphasized further. Commercial and societal impact of the paper can be further revisited.

6. Quality of Communication: Does the paper clearly express its case, measured against the technical language of the fields and the expected knowledge of the journal's readership? Has attention been paid to the clarity of expression and readability, such as sentence structure, jargon use, acronyms, etc.: Quality of communication is generally acceptable and adheres to the requirements of the Journal.

Management of Environ. Quality.pdf
42K

Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Reminder: Management of Environmental Quality

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Mon, Jul 11, 2022 at 12:51 PM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id

11-Jul-2022

Dear Dr. Pujiati:

Recently, you received a decision on Manuscript ID MEQ-02-2022-0034, entitled "What Are the Factors that Differentiate Environmental Quality? Evidence from the Island of Java and Non-Java in Indonesia." The manuscript and decision letter are located in your Author Centre at https://mc.manuscriptcentral.com/meq.

This e-mail is simply a reminder that your revision is due in two weeks. If it is not possible for you to submit your revision within two weeks, we will consider your paper as a new submission.

Sincerely,
Prof. Song
Associate Editor, Management of Environmental Quality
songmartin@163.com

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Reminder: Management of Environmental Quality

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Mon, Jul 11, 2022 at 1:30 PM
To: songmartin@163.com

Dear, Prof. Song,

Thank you for the reminder. We are on our way to revise the paper and we will make sure we will send it back before the due date.

[Quoted text hidden]

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Submission for MEQ-02-2022-0034

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Thu, Jul 21, 2022 at 3:03 PM
To: Malin Song <songmartin@163.com>

Dear, Editor of Management of Environment Quality (MEQ)

I would like to return the revision draft for my paper (MEQ-02-2022-0034). I have already submitted it on ScholarOne.
1. In this new document, we added two more authors.
2. We have complied with the template such as adding an abstract. We have highlighted the part where we edited.
3. The revised paper is according to the reviewers' comments:
a. Originality;
b. Relationship to
c. Literature;
d. Methodology;
e. Results;
f. Implications for research, practice, and society; and
3. Tambahan referensi sesuai perminraan reviewer

We attach three documents here, the original draft, proofread document, and proofreading statement and tables. We would love to hear from you soon. Thank you.

10 attachments

Amin Pujiati_MEQ-02-2022-0034_Proofread Statement.pdf
37K

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150K

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Table I.docx
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Table V.docx
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Table IV.docx
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Table II.docx
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Table III.docx
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Submission for MEQ-02-2022-0034

Malin Song <songmartin@163.com> Thu, Jul 21, 2022 at 3:24 PM
To: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Noted with thanks!

Malin

--

Prof. Dr. Malin Song
Collaborative Innovation Center for Ecological Economics and Management,
Anhui University of Finance and Economics,
No. 962, Caoshan Road, Anhui Bengbu, P. R. China, 233030,
Fax: +8605523171212

[Quoted text hidden]

Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - MEQ-02-2022-0034.R1

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Thu, Jul 21, 2022 at 2:57 PM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id

21-Jul-2022

Dear Dr. Pujiati:

Your manuscript entitled "What are the Factors that Determine Differing Levels of Environmental Quality? Evidence from Java and Other Islands in Indonesia" has been successfully submitted online and is presently being given full consideration for publication in the Management of Environmental Quality.

Your manuscript ID is MEQ-02-2022-0034.R1.

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to Manuscript Central at https://mc.manuscriptcentral.com/meq and edit your user information as appropriate.

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If you would like to publish your article open access please contact openaccess@emeraldgroup.com

Thank you for submitting your manuscript to the Management of Environmental Quality.

Sincerely,
Malin Song
Management of Environmental Quality Editorial Office

https://orcid.org/0000-0002-3694-9846

Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - MEQ-02-2022-0034.R1

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Sun, Jul 24, 2022 at 8:16 AM
To: songmartin@163.com

Thank you, Editor.

I would like to ask since I am from low to middle income country, is there a possibility I could waiver the cost of APC?
[Quoted text hidden]

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - MEQ-02-2022-0034.R1

Malin Song <songmartin@163.com> Sun, Jul 24, 2022 at 10:15 AM
To: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

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Prof. Dr. Malin Song
Collaborative Innovation Center for Ecological Economics and Management,
Anhui University of Finance and Economics,
No. 962, Caoshan Road, Anhui Bengbu, P. R. China, 233030,
Fax: +8605523171212

[Quoted text hidden]

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - Author update

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Sun, Jul 24, 2022 at 3:22 PM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id, triani.nurbaeti@mail.unnes.ac.id, nadia.damayanti@mail.unnes.ac.id

24-Jul-2022

Dear Author(s),

It is a pleasure to inform you that your manuscript titled What are the Factors that Determine Differing Levels of Environmental Quality? Evidence from Java and Other Islands in Indonesia (MEQ-02-2022-0034.R1) has passed initial screening and is now awaiting reviewer invitation.

The manuscript was submitted by Dr. Amin Pujiati with you listed as a co-author.

As you are listed as a co-author, if you have not already done so please log in to https://mc.manuscriptcentral.com/meq and check that your account details are complete and correct, these details will be used should the paper be accepted for publication.

Yours sincerely,
Prof. Malin Song
Editor, Management of Environmental Quality

Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - Author update

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Tue, Jul 26, 2022 at 4:48 AM
To: songmartin@163.com

Dear Editor

How do we change the email address on https://mc.manuscriptcentral.com/meq for (MEQ-02-2022-0034.R1)? Two of the email addresses above are inactive and will be replaced with active ones.

[Quoted text hidden]

Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - Author update

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Fri, Jul 29, 2022 at 3:30 PM
To: songmartin@163.com

Dear Prof. Song

Here we provide our active emails of us since we wish to change some of our emails. Triani Nurbaeti (trianin13@gmail.com) and Nadia Damayanti (nadiadam20@gmail.com). Hopefully, this information can help the editor reach us easily through email. Thank you.

Best regards.

On Sun, Jul 24, 2022 at 3:22 PM Management of Environmental Quality <onbehalfof@manuscriptcentral.com> wrote:
[Quoted text hidden]

Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Adding new author

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Mon, Aug 1, 2022 at 2:53 PM
Reply-To: amin.pujiati@mail.unnes.ac.id
To: songmartin@163.com
Cc: amin.pujiati@mail.unnes.ac.id

Dear Prof. Song

We would like to change some of our authors' emails. Our article is What are the Factors that Determine Differing Levels of Environmental Quality? Evidence from Java and Other Islands in Indonesia (MEQ-02-2022-0034.R1). Here are the emails for each author: Nadia Damayanti (nadiadam20@gmail.com) and Triani Nurbaeti (trianin13@gmail.com).

Thank you. We would love to hear from you soon.

Best Regards.

Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Self-archiving Instructions

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Mon, Sep 12, 2022 at 8:27 AM
Reply-To: permissions@emeraldinsight.com
To: amin.pujiati@mail.unnes.ac.id

11-Sep-2022

Dear Pujiati, Amin; Nurbaeti, Triani; Damayanti, Nadia,

"What are the Factors that Determine Differing Levels of Environmental Quality? Evidence from Java and Other Islands in Indonesia"

Effective from September 2017, Emerald has removed the embargo period across all journals for the self-archiving of the Author Accepted Manuscript (AAM). This enables all of our authors to make their article open access via a 'green' route. The full text of the article may therefore become visible within your personal website, institutional repository (IR), subject repository, SCN signed up to the Voluntary STM Sharing Principles as soon as the final version has been published in the journal. It may also be shared with interested individuals, for teaching and training purposes at your own institution and for grant applications.

Please refer to the terms of your own institution to ensure full compliance.

The date your article was accepted for publication was: (11-Sep-2022)

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- Or if applicable, forward your accepted manuscript to your institution's Repository Manager.
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To deposit your AAM, you will need to adhere to the following conditions:
- You must include the DOI (10.1108/MEQ-02-2022-0034) back to the official published version of your article within www.emeraldinsight.com;
- Include all of the relevant metadata (article title, journal name, volume, issue no. etc.).
- The AAM must clearly indicate where the article was published, or where it is forthcoming;
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- Include the article abstract (see below).

To identify variables that determine the differing levels of environmental quality on Java and other islands in Indonesia.

Using a quantitative approach, secondary data was sourced from the Central Statistics Agency and the Ministry of Environment and Forestry. The data was obtained through the collection of documentation from 33 provinces in Indonesia. The analytical approach used was discriminant analysis. The research variables are Trade Openness, Foreign Direct Investment (FDI), industry, HDI and population growth.
The variables that distinguish between the levels of environmental quality in Indonesian provinces on the island of Java and on other islands are Industry, HDI, FDI, and population growth. The openness variable is not a differentiating variable for environmental quality. The most powerful variable as a differentiator of environmental quality on Java Island and on other islands is the Industry variable
This study has not classified the quality of the environment based on the Ministry of Environment and Forestry's categories, namely the very good, good, quite good, poor, very poor and dangerous. For this reason, further research is needed using Multiple Discriminant Analysis (MDA).
Industry is the variable that most strongly distinguishes between levels of environmental quality on Java and other island, while the industrial sector is the largest contributor to Gross Regional Domestic Product (GDRP). Government policy to develop green technology is mandatory so that there is no trade off between industry and environmental quality.
This study is able to identify the differentiating variables of environmental quality in two different groups, on Java and on the other islands of the Indonesian archipelago.

Please note that the full text of the AAM must only appear in the IR once the final version of the article has been published in the journal.

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Laura Wilson
Head of Rights, Emerald Publishing

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - Account Modified in Manuscript Central

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Mon, Sep 12, 2022 at 8:09 PM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id, trianin13@gmail.com

12-Sep-2022

Dear Dr. Pujiati:

This e-mail is a notification that your account on Management of Environmental Quality - Manuscript Central site has been modified. Your USER ID and PASSWORD for your account at https://mc.manuscriptcentral.com/meq is as follows:

USER ID: amin.pujiati@mail.unnes.ac.id
PASSWORD: If you are unsure of your password you can click the link below which will take you directly to the option for setting a new password.

https://mc.manuscriptcentral.com/meq?URL_MASK=6ae221ff7cac4c948c6196b24625ae6b

Please note that the single use link will expire on 15-Sep-2022 1:09:52 PM GMT / 15-Sep-2022 9:09:52 AM EDT.
If the single use link has expired, you can generate a single use password by entering your email address into the Password Help function on your site log in page: https://mc.manuscriptcentral.com/meq

Thank you for your participation.

Sincerely,
Management of Environmental Quality Editorial Office

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - Decision on Manuscript ID MEQ-02-2022-0034.R1

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Mon, Sep 12, 2022 at 8:27 AM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id

11-Sep-2022

Dear Pujiati, Amin; Nurbaeti, Triani; Damayanti, Nadia

It is a pleasure to accept your manuscript MEQ-02-2022-0034.R1, entitled "What are the Factors that Determine Differing Levels of Environmental Quality? Evidence from Java and Other Islands in Indonesia" in its current form for publication in Management of Environmental Quality. Please note, no further changes can be made to your manuscript.

Please go to your Author Centre at https://mc.manuscriptcentral.com/meq (Manuscripts with Decisions for the submitting author or Manuscripts I have co-authored for all listed co-authors) to complete the Copyright Transfer Agreement form (CTA). We cannot publish your paper without this.

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Thank you for your contribution. On behalf of the Editors of Management of Environmental Quality, we look forward to your continued contributions to the Journal.

Yours sincerely,
Prof. Malin Song
Associate Editor, Management of Environmental Quality
songmartin@163.com

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality - Decision on Manuscript ID MEQ-02-2022-0034.R1

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Mon, Sep 12, 2022 at 9:00 PM
To: songmartin@163.com

Thank you, Prof Song

We have been wanting to ask you about changing incorrect contact details, especially Triani's and Nadia's emails. I have tried to click my name at the top right of the screen, but I don't find the place to change their emails, instead, I fill my primary and secondary CC emails with theirs. I might have done it the wrong way because it doesn't change their emails on CTA. Could you mind helping us?

Thank you very much
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

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Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Tue, Sep 13, 2022 at 7:31 PM
Reply-To: songmartin@163.com
To: amin.pujiati@mail.unnes.ac.id, trianin13@gmail.com

13-Sep-2022

Dear Dr. Pujiati,

Recently, your manuscript entitled 'What are the Factors that Determine Differing Levels of Environmental Quality? Evidence from Java and Other Islands in Indonesia' (MEQ-02-2022-0034.R1) was accepted for publication in Management of Environmental Quality. This e-mail is a reminder that you have not yet completed a copyright form. We are unable to publish your paper without it.

When completing this form please take the opportunity to check that your contact details are correct. If your details need to be updated, please access your account details by clicking on your name at the top right of the screen. Please note that this must be done prior to you submitting your copyright form.

You can access the form by clicking on the following link:

https://mc.manuscriptcentral.com/meq?URL_MASK=7ec380c3aa544da1982ae7612e655548

If you have any questions, please let me know.

Yours sincerely,
Malin Song
Management of Environmental Quality, Editorial Office
songmartin@163.com

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Management of Environmental Quality <onbehalfof@manuscriptcentral.com> Wed, Sep 21, 2022 at 11:53 AM
Reply-To: dipti.emerald@kwglobal.com
To: amin.pujiati@mail.unnes.ac.id, trianin13@gmail.com

21-Sep-2022

MEQ-02-2022-0034.R1 - What are the Factors that Determine Differing Levels of Environmental Quality? Evidence from Java and Other Islands in Indonesia

Dear Dr. Pujiati:

Congratulations on the acceptance of your article for publication in Management of Environmental Quality!

I am writing to you, as upon submission of your article, you answered yes to the following question:
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Please note that we will not be able to proceed with publishing your article under the CC BY licence until we have received the Article Processing Charge.

If you have any queries, please let me know.

Sincerely,
Ms. Dipti Chawathe
Management of Environmental Quality

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Wed, Sep 21, 2022 at 4:55 PM
To: dipti.emerald@kwglobal.com

Dear Ms. Dipti

Thank you for the information that you share. It is true I chose to publish Open Access, but it was due to Indonesia as middle-income country that is eligible for a 50% APC waiver (https://www.emeraldgrouppublishing.com/publish-with-us/author-policies/our-open-research-policies). Is this information true?

Thank you
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Dipti Emerald <Dipti.Emerald@kwglobal.com> Thu, Sep 22, 2022 at 12:17 PM
To: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Dear Amin,

I have forwarded your query to respective person.

But the concern person is on annual leave until Monday 26 September, I will let you know once I receive response.

Many thanks.

Dipti,

Best Regards,
Dipti Chawathe
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From: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>
Sent: Wednesday, September 21, 2022 3:25 PM
To: Dipti Emerald <Dipti.Emerald@kwglobal.com>
Subject: Re: Management of Environmental Quality

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Mon, Sep 26, 2022 at 9:59 PM
To: Dipti Emerald <Dipti.Emerald@kwglobal.com>

Dear Ms Dipti

I was wondering about my last question to you about APC. Has there been any answer regarding that?
Please let me know

Thank you
[Quoted text hidden]

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Tue, Sep 27, 2022 at 6:52 PM
To: Dipti Emerald <Dipti.Emerald@kwglobal.com>

Dear Ms. Dipti

Thank you for your brief and clear information. I will proceed with publishing on Open Access. I will send you the form tomorrow.

Yours sincerely
[Quoted text hidden]

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Dipti Emerald <Dipti.Emerald@kwglobal.com> Tue, Sep 27, 2022 at 12:12 PM
To: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Dear Amin,

The 50% waiver applies to the fully OA journals only – this means that it only applies on IJCCSM and MIJ. In other words, the author cannot get a waiver for the MEQ(**Management of Environmental Quality**) journal.

If you would like to publish your article open access in the "**Management of Environmental Quality**" the APC (article processing charge) is £2,495/$3,370/€2,880. This covers the cost of turning a manuscript into a published article and dissemination to the widest audience.

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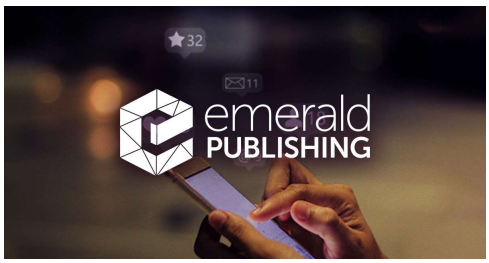

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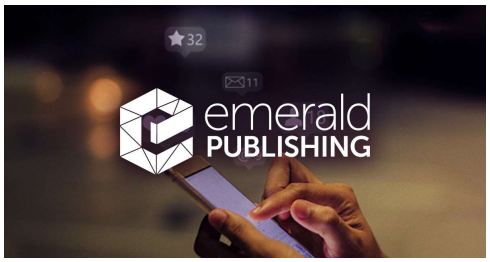

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Best Regards,
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From: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>
Sent: Monday, September 26, 2022 8:29 PM
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Dipti Emerald <Dipti.Emerald@kwglobal.com> Wed, Sep 28, 2022 at 11:01 AM
To: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Dear Amin,

Thank you for your response.

Best Regards,
Dipti

Dipti Chawathe *(She/Her)*
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Sent: Tuesday, September 27, 2022 5:22 PM
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Dipti Emerald <Dipti.Emerald@kwglobal.com> Wed, Sep 28, 2022 at 12:21 PM
To: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Dear Amin,

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Sent: Tuesday, September 27, 2022 5:22 PM
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Wed, Sep 28, 2022 at 2:37 PM
To: dipti.emerald@kwglobal.com

MEQ-02-2022-0034.R1 - What are the Factors that Determine Differing Levels of Environmental Quality? Evidence from Java and Other Islands in Indonesia

Dear Ms. Dipti

As I said yesterday, I would like to publish my journal Open Access. I would like to return the form for Open Access publication. Aside from that, what volume and edition will my article be published in? And, please, correct me if I'm wrong but my article will not be in the special issue, right?

Thank you

On Wed, Sep 21, 2022 at 11:53 AM Management of Environmental Quality <onbehalfof@manuscriptcentral.com> wrote:
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Wed, Sep 28, 2022 at 2:40 PM
To: Dipti Emerald <Dipti.Emerald@kwglobal.com>

Hello Ms. Dipti

I am so sorry for not sending the details along with the OA license. Can you please give me the details of where I can transfer the money to? The table above is written as "recipient", shouldn't it be "sender"?
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Dipti Emerald <Dipti.Emerald@kwglobal.com> Wed, Sep 28, 2022 at 3:55 PM
To: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Dear Amin,

Could you please send revised Open access license with processing fee £2,495/$3,370/€2,880?

As I said yesterday, I would like to publish my journal Open Access. I would like to return the form for Open Access publication - **Could you please send here completed Open access form?**

Aside from that, what volume and edition will my article be published in? - **You will get to know this after exporting**

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The table above is written as "recipient", shouldn't it be "sender"? - **Invoice recipient details are those who receive the invoice receipt from the respective team and the one who pays the invoice amount.**

Many thanks.

Best Regards,
Dipti

Dipti Chawathe *(She/Her)*
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From: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>
Sent: Wednesday, September 28, 2022 1:07 PM
To: Dipti Emerald <Dipti.Emerald@kwglobal.com>
Subject: Re: Management of Environmental Quality

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[Quoted text hidden]

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Thu, Sep 29, 2022 at 10:11 AM
To: Dipti Emerald <Dipti.Emerald@kwglobal.com>

Hello Ms. Dipti

My apologies for sending you the incomplete form. I attach the proper form where I choose the fee to be £2,495. I also would like to send the invoice details below. I thank you very much for answering my questions.

Name of invoice recipient: Amin Pujiati
Address line 1: Gedung L1 Kampus Sekaran, Gunungpati, Semarang 50229
Address line 2: Kota Semarang
Address line 3: Provinsi Jawa Tengah
Postcode: 50229
Country: Indonesia
VAT number (EU only)
Email address of invoice recipient: amin.pujiati@mail.unnes.ac.id
Currency (dropdown): Pound sterling £
Amount (excluding VAT): 2,495
Purchase order number: MEQ-02-2022-0034.R1
Invoice delivery (dropdown): amin.pujiati@mail.unnes.ac.id

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Dipti Emerald <Dipti.Emerald@kwglobal.com> Thu, Sep 29, 2022 at 12:52 PM
To: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Dear Amin,

Thank you so much.

We will let you know if anything else is needed.

Stay safe.

Best Regards,
Dipti

Dipti Chawathe *(She/Her)*
On behalf of the Emerald Peer Review team | Emerald Publishing
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From: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>
Sent: Thursday, September 29, 2022 8:41 AM
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Tue, Oct 4, 2022 at 9:41 AM
To: Dipti Emerald <Dipti.Emerald@kwglobal.com>

Dear Ms. Dipti

I'd like to ask about payment. Do I have to wait for the Letter of Acceptance and invoice to pay for the article?

Thank you
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Management of Environmental Quality

Dipti Emerald <Dipti.Emerald@kwglobal.com> Tue, Oct 4, 2022 at 1:15 PM
To: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Dear Amin,

Please wait for Invoice then pay.

Many thanks.

Best Regards,
Dipti

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On behalf of the Emerald Peer Review team | Emerald Publishing
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From: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>
Sent: Tuesday, October 4, 2022 8:11 AM
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Emerald Open Access invoice

Lisa Gill <lgill@emerald.com> Wed, Oct 5, 2022 at 7:56 PM
To: "amin.pujiati@mail.unnes.ac.id" <amin.pujiati@mail.unnes.ac.id>

Hello,

I hope you're well.

I have been asked to send the attached Open Access invoice, payment information is included on the invoice but please let me know if you need anything else at all.

Thank you,

Lisa

Lisa Gill

Customer Operations Executive

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Emerald Open Access invoice

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Thu, Oct 6, 2022 at 11:47 AM
To: Lisa Gill <lgill@emerald.com>

Hello,

Thank you for sending the OA, I will proceed to pay as soon as possible. I also would like to ask you whether it's possible to obtain the Letter of Acceptance as it's needed for reporting to my institution

Thank you
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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Emerald Open Access invoice

Amin Pujiati <amin.pujiati@mail.unnes.ac.id> Thu, Oct 6, 2022 at 12:13 PM
To: Lisa Gill <lgill@emerald.com>

Hello,

I am sorry i left a question behind. What volume and number will my article be?

Thank you

On Wed, Oct 5, 2022 at 7:56 PM Lisa Gill <lgill@emerald.com> wrote:
[Quoted text hidden]

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Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Emerald Open Access invoice

Lisa Gill <lgill@emerald.com> Thu, Oct 6, 2022 at 10:51 PM
To: Amin Pujiati <amin.pujiati@mail.unnes.ac.id>

Hi,

Thanks for your email, I will confirm once the payment has been received and I will request that the Open Access team contacts you with regard to your request for the Letter of Acceptance and the article volume details.

Kind regards,

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Journal:	*Management of Environmental Quality*
Manuscript ID	MEQ-02-2022-0034.R1
Manuscript Type:	Research Paper
Keywords:	environmental quality, foreign direct investment, human development index, industry, population, discriminant analysis

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What are the Factors that Determine Differing Levels of Environmental Quality? Evidence from Java and Other Islands in Indonesia

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Abstract

Purpose – To identify variables that determine the differing levels of environmental quality on Java and other islands in Indonesia.

Design/methodology/approach – Using a quantitative approach, secondary data was sourced from the Central Statistics Agency and the Ministry of Environment and Forestry. The data was obtained through the collection of documentation from 33 provinces in Indonesia. The analytical approach used was discriminant analysis. The research variables are Trade Openness, Foreign Direct Investment (FDI), industry, HDI and population growth.

Findings – The variables that distinguish between the levels of environmental quality in Indonesian provinces on the island of Java and on other islands are Industry, HDI, FDI, and population growth. The openness variable is not a differentiating variable for environmental quality. The most powerful variable as a differentiator of environmental quality on Java Island and on other islands is the Industry variable

Research limitations/implications – This study has not classified the quality of the environment based on the Ministry of Environment and Forestry's categories, namely the very good, good, quite good, poor, very poor and dangerous. For this reason, further research is needed using Multiple Discriminant Analysis (MDA).

Practical implications. – Industry is the variable that most strongly distinguishes between levels of environmental quality on Java and other island, while the industrial sector is the largest contributor to Gross Regional Domestic Product (GDRP). Government policy to develop green technology is mandatory so that there is no trade off between industry and environmental quality.

Originality/value – This study is able to identify the differentiating variables of environmental quality in two different groups, on Java and on the other islands of the Indonesian archipelago.

Keywords – Environmental Quality, FDI, HDI, Industry, Population, discriminant analysis

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Introduction

The idea behind sustainable development is a concept that balances economic, social, and environmental factors. Development in developing countries, in general, sees an imbalance between high economic growth and development in other fields, especially environmental factors. However, implementation development in Indonesia has not been optimal. Its success is seen in terms of economic indicators being out of balance with other development indicators, especially environmental indicators (Fauzi and Oktavianus, 2014). The imbalance between economic and environmental development in Indonesia is visible in the contrats between the island of Java and the other islands (sometimes referred to as non-Java islands). The imbalance between economic, social, and environmental development mainly occurs on Java, which can be seen from the inter-island environmental quality index (IKLH). According to the IKLH in 2010-2019, Java was the lowest ranked island compared to the other islands in Indonesia, with an average of 52 points, while other islands (Papua, Maluku, Sulawesi, Kalimantan, Bali and Nusa Tenggara, and Sumatra) had an average of 82 points. Based on the IKLH's categorization, a score on the index that is above 80 is considered very good, while $50 < \textbf{IKLH} \leq 60$ is considered not good (*Kementerian Lingkungan Hidup dan Kehutanan*, 2020). According to the IKLH categories, the average environmental index on Java is generally good whereas on the other islands the indexes are not too good.

The difference in environmental quality between Java and other islands is an important phenomenon to be researched in the context of the current plan to move the capital city of Indonesia based on Law No.3 of 2022 concerning the

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State Capital which relates to the capital city of Indonesia being located on the island of Kalimantan (and no longer on Java) whose predicate, based on the IKLH, is very good. Some researchers have explained that the reasons behind relocating the capital are population density, environmental degradation, and urban inconvenience (Rachmawati *et al.*, 2021). Relocation of the capital will have its own consequences for environment in the future. A city that has fewer citizens will grow into a metropolitan area. Conflict between economic growth, social, and environment will continue to happen (Buchori *et al.*, 2017, 2020; Buchori and Sugiri, 2016; Chen *et al.*, 2017; Sugiri *et al.*, 2011; United Nations, 2014). The outlook is that, by identifying the aspects that distinguish between environmental quality on Java and on islands other than Java, the results can become the basis for making decisions so that the quality of the environment on the other island (Kalimantan) remain very good despite the capital relocation.

Another reason that distinguishes between the environmental quality in Java and the other islands of Indonesia is the conditions affecting them are very different and unique. The contribution to Gross Regional Domestic Product (GDRP) by Java and the other islands and to Gross National Product (GNP) are distinct. The contribution of the industrial sector to GDRP is very different due to contrasts between the facilities and infrastructure. Java and the other islands are different in terms of population density. The denser the population, the worse the environmental quality (Oktavilia *et al.*, 2019; Pujiati *et al.*, 2018, 2019; Pujiati and Imron, 2020). The increasing population, the need for transportation, land, food cause the quality of the environment to decline (Chowdhury and Hossain, 2018; Malthus, 1798; Musse *et al.*, 2018).

There are some factors that can intervene in terms of environmental quality such as GDRP, energy consumptiom, population growth, literacy, urbanization rate, and foreign direct investment (FDI) (Fakher and Abedi, 2017;

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Fakher, 2019; Hao *et al.*, 2018). FDI has a positive impact on environmental quality in developing countries but does not apply in developed countries. Trade openness can reduce the impact of carbon emissions in developed countries but does not apply in developing countries (Khan *et al.*, 2021). Economic growth, especially in developing countries, is the reason for the decline in environmental quality (Mukhopadhyay and Pani, 2022). The other influencing factor is HDI. Evironmental performance and HDI are positively correlated in both developed and developing countries (Hickel, 2020; Lai and Chen, 2020).

Trade openness benefits the community and the state in terms of foreign exchange, but if there is no trade restriction regulation, it causes the entry of low-quality and high-emission energy consumption goods, thereby increasing carbon emissions. (Acheampong et al., 2019; Coskuner et al., 2020; Kwakwa, 2020). There are different points of view regarding trade and environmental quality (Esmaeilpour Moghadam and Dehbashi, 2018; Fakher and Abedi, 2017; Soylu et al., 2021), where trade can be seen as damaging the environment or as having the effect of improving environmental quality (Chen and Hu, 2020; Xie and Wu, 2021).

The industrial sector's contribution, which dominates the GDRP, on the one hand increases economic development and the other hand decreases environmental quality. Most of it is generated from the industrial sector's contribution, which harms environmental quality such as water pollution, air pollution, land pollution, and land conversion. Industry plays a vital role in environmental and ecosystem damage in an area (Shahabadi *et al.*, 2017). Industry's role in the era of globalization, with increasingly open international trade, cannot be avoided. Vural (2021) states that economic development can increase innovation and produce new inventions to build more environmentally friendly resources. The theory that explains the relationship between industry

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and the environment can be explained through the Environmental Kuznet Curve (EKC) theory.

Lau et al (2018) studied 100 developed and developing countries to examine the EKC hypothesis based on the quality of institutions, resulting in the conclusion that there is an inverse U-relationship with economic growth and carbon dioxide emissions in developed countries which is not found in developing countries. Sarkodie and Strezov (2018) found that the driving factor for carbon emissions in developed and developing countries is the economy based on agriculture, transportation, and services, paradigm shifting, and structure in industries in Australia, China, Ghana, and the USA in 1971-2013.

The population also influences the quality of the environment. The more the population increases, the more needs there are that must be met, including housing, transportation, goods, and services. According to Todaro (2000), population spikes have resulted in environmental degradation or the erosion of minimal natural resources. Exploitation activities that are not guided by environmental management can reduce the availability of limited resources. Population density, energy and mining activity, and fossil exploration can increase CO2 production (Heidari *et al.*, 2015; Jebli *et al.*, 2017; Wang *et al.*, 2018; Yahaya and Hussaini, 2020). The increase in population will increase the demand for land clearing for housing (Ohlan, 2015; Rahman, 2017).

The quality of the population can be seen from the human development index. The ability of human resources to engage in the production process will determine the results, which will later become the endowment factor of a country's comparative advantage. The higher the HDI value in an area, the better the quality of human resources there. Increased knowledge and duration of education, income per capita, and health are essential factors in preserving the environment (Shahabadi et al., 2017). Increasing human capabilities can be used

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as capital in processing resources to be more efficient and produce outputs that are more environmentally friendly.

There are still differences between the research results related to factors that affect environmental quality, the openness factor, FDI, Industry, Population and HDI which are currently unavoidable by countries globally; it is crucial to research factors that affect environmental quality.The difference between this and previous research is that previous research tends to focus on HDI as the indicator variable. Previous research has examined the HDI indicators separately such as levels of education, health and literacy. Indicators of impact on the environment, such as education (Garnawat *et al.*, 2017; Imamoglu, 2018; Mujan *et al.*, 2019; Vilcekova *et al.*, 2017), health (Alola and Kirikkaleli, 2019; Zomorrodi and Zhou, 2017), as well as literacy rates (Musse *et al.*, 2018) on environmental quality. Arisman (2018) found that HDI reflects the quality of HR by showing the fixed effect model on population and GDP per capita affects HDI rankings in ASEAN countries.

The novelty that the researcher is seeking to present is regarding the views that exist on the island of Java and on the other islands are attached to variables that can affect the ability of the region to be more responsive to the environment related to them using secondary data with coverage throughout Indonesia. The discriminant analysis tool has two categories; the first is the dependent variable, namely the quality of the environment on Java and on other islands, which can provide a more detailed and helpful discussion for policymaking. Discriminant analysis is used to identify two different groups (Stella, 2019) for example, based on the category of loyal and non-loyal consumers (Isliko, 2016), and based on economic status (strong or weak) (Egbo and Bartholomew, 2017). This research aims to identify what factors

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differentiate between the levels of environmental quality of provinces on the island of Java and on the other islands.

Literature Review

Impact of Trade Openness on Environmental Quality

Trade openness has a connection and will influence FDI (Burange et al., 2019; Djulius, 2017; Makoni, 2018; Rakshit, 2022; Rathnayaka Mudiyanselage et al., 2021). Kumari et al (2021) found that there was a long term causal connection between FDI, trade openness, and economic growth in India and FDI and trade openness influenced both ways.

Trade openness and FDI in a country where investment circulates will influence the whole ecosystem (Le et al., 2016; Oktavilia and Firmansyah, 2016; Tran and Do, 2021). This idea lead to the hypotheses of pollution halo and pollution haven through the EKC. According to Tran and Do (2021), trade openness and FDI caused environmental degradation in Malaysia and Indonesia in the long term but not in Thailand. Le et al. (2016) found that trade openness impacted positively in high-income countries, but had a negative impact in low and middle income countries. Sajid et al. (2020) found that by using trade openness, FDI, and institution performance as variables influencing the environment found that there was a positive relationship between trade openness and urbanization in terms of the ecological footprint but found no relationship with institution performance.

Impact of FDI on Environmental Quality

Simon Kuznets, using his Environment Kuznets Curve, stated that economic activity will destroy the environment but when the income increases,

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the demand for environmental treatment will rise with the availability of sources of investment (Isiksal, 2021; Isiksal et al., 2019). The validity of EKC was demonstrated in Indonesia and China (Sarkodie and Strezov, 2019)

In another theory, investment-based economic growth is tested with two hypotheses, namely the pollution haven hypothesis and the pollution halo hypothesis (Adeel-Farooq et al., 2021). The two hypotheses are still closely related to the EKC: the pollution haven hypothesis states that tighter environmental policies at home and looser ones abroad cause developed countries to move industries that harm the environment to more developed countries, causing developing countries to become "pollution havens" for pollution-intensive industries (Bulus and Koc, 2021; Guzel and Okumus, 2020; Sarkodie and Strezov, 2019; Singhania and Saini, 2021; Ur Rahman et al., 2019). On the other hand, developed countries transfer technological progress, environment-based FDI, and better environmental standards to developing countries which are incorporated into the pollution halo hypothesis, so that FDI from developed countries can improve environmental quality in developing countries (Balsalobre-Lorente et al., 2019; Mert and Caglar, 2020; Oktavilia et al., 2019; Pujiati, Oktavilia, et al., 2020).

The Impact of Industry on Environmental Quality

According to Febriana (2019), the production process in the industrial sector produces liquid and solid waste that can pollute the environment. This is endorsed by Shahabadi (2017) who explains that industrial activities will increase the use of vehicles that produce emissions in the air and the disposal of waste that can harm ecosystems in an area. The study was supported by Cui et al. (2020) who state that industrial growth causes environmental damage.

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However, according to Fibrianto (2018), an increase in activity in the industrial sector will increase a country's GDP revenue, and this will affect the increase in financing for environmental management.

The Impact of Population on Environmental Quality

According to Han et al. (2018) and Pujiati et al. (2020), human population plays an important role in increasing PM2.5 pollution. In his research, Ghanem (2018) found that an increase of one percent of the population led to a 2.4 percent increase in pollution and an increase in pollution caused a decrease in health which led to a decrease in labor productivity. Population has other impacts besides the environment including poverty and economic growth. Nabi et al. (2020) found that there is a positive relationship between poverty levels and carbon emissions in 98 developed and developing countries.

The Impact of HDI on Environmental Quality

Using the HDI (Human Development Index) is one way to view the quality of human life in a country based on life expectancy, education, and health. Several studies have shown that life expectancy, education, and health are influenced by the quality of the environment (Ghanem, 2018; Han et al., 2018; Hossain and Chen, 2021; Joof and Isiksal, 2021; Nabi et al., 2020). According to Ladi et al. (2021), water quality can have an effect on HDI. Li and Xi (2021) studied the Environmental Damage Index (EDI) and HDI in provinces in China found that environmental damage causes a delay in economic growth and every 0.01 percent increase in environmental damage reduces GDP by 3.15 percent.

Methods

Type and Source of Data

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This study uses a quantitative research approach. The data used are secondary data sourced from the Central Statistics Agency and the Ministry of Environment and Forestry. The analytical method is discriminant analysis which is used to build predictive models for each group. In this research, two groups are studied: a group of provinces located on the island Java and a group of provinces on other islands (outside Java). Discriminant Analysis requires a combination of linear derivatives between two or more variables that will discriminate against each other through the groups that have been developed. (Keskin et al., 2020). A simple linear discriminant function converts the sample size to the discriminant value (Ismail et al., 2016).

Variables and operational definitions

The variables used are the environmental quality index (IKLH), trade openness (TO), foreign investment (FDI), industrial output (IND), population growth (POP), and Human Development Index (HDI) in 33 provinces in Indonesia. IKLH is measured using three components comprising indexes for water quality, air quality, and land cover with units expressed as a percentage. Trade openness (TO) is measured by adding the number of exports and imports divided by GDRP as a percentage. FDI is measured by direct investment by foreign parties in units of USD millions. IND is measured by the total contribution of the industrial sector to GDRP in billions of rupiah. POP is measured by calculating the change in population compared to the previous year in percentage. HDI is measured from education, health, and a decent standard of living in an index expressed as units.

Model and Analysis Steps

The equation for the estimation of the discriminant function in the two groups in this study uses the discriminant model (Hair, 1998; Vazquez-Brust and Plaza-úbeda, 2021; Wang, Zou, et al., 2013):

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$$Zjk = a + W_1X_{1k} + W_2X_{2k} + ... + W_nX_{nk} \quad (1)$$

Noted as:

Zjk = discriminant Z score of discriminant function j for object k

A = intercept

W*i* = discriminant weight for independent variable *i*

X*i*k = independent variable *i* for object

Or the discriminant function equation can be calculated from the standardized value as follows:

Dj = DI1Z1 + DIZz2 + ….. + dipzp …….. (2)

An individual's standardized score on the *i*-th discriminant function (D*i*) is found by multiplying the standardized score on each predictor (z) by its standardized discriminant function coefficient (d*i*) and then adding the products for all predictors (Stella, 2019).

To test whether there is a significant difference between the two groups in Java and non-Java, it can be done using the Wilk's Lambda test statistic and can be converted into an F ratio. If the significance of the F ratio <0.05 then the discriminant variable can be used to form the discriminant model and vice versa. The reason for using Wilk's Lambda as a test in discriminant analysis is because the method used is robust (Alrawashdeh and Radwan, 2017).

To test the differences between the two groups of environmental quality in Java and outside Java for all variables, the Chi-Square was used together. If the Chi-square significance value is <0.05, then the discriminant functions for the two groups are significantly different and vice versa. The next step is to test how big and meaningful the difference between the two groups is can be seen from the value of the square canonical correlation (CR^2). CR^2 is identical to R^2 in the regression that measures the variation between the two groups of

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environmental quality in Java and Non-Java which can be explained by discriminant variables.

Result and Discussion

This section will identify factors that determine the different quality of the environment in provinces of Java and on other islands. There are several stages of analysis, the first being descriptive statistics. According to descriptive statistics, the average trade openness, foreign investment, industrial sector output, population growth, and human development index in provinces of Java (code 1) are higher than in provinces outside Java (code 0). These even exceed the average in Indonesia (Table 1). Foreign investment and the output of the industrial sector in the provinces of Java are very different. Foreign investment in Java Island averaged USD 2,517 million, whereas provinces outside Java avergaed USD 451 million, and provinces in Indonesia averaged USD 826 million. This shows that better infrastructure and facilities in the provinces of Java are more attractive for foreign investors. The average foreign investment is in line with the average contribution of industrial output to GDRP.

Table I. **Average Trade, FDI, Industry, Population Growth and Human Development Index on Java (1) and outside Java (0)**

ISLAND		Mean
0	TRADE	50.1516
	FDI	451.0960
	IND	22507.5365
	POP	2.0526
	HDI	67.1203
1	TRADE	55.1307

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	FDI	2517.0024
	IND	243102.3479
	POP	1.4357
	HDI	71.8652
Total	TRADE	51.0569
	FDI	826.7154
	IND	62615.6840
	POP	1.9404
	HDI	67.9830

Second, the test of equality of group means all variables FDI, IND, POP, HDI are significant other than the trade openness variable. This test shows that in addition to trade openness, it can be used to form the discriminant variable because the significance value is >0.05 or 0,493 (Table 2). Wilk's Lambda test was used. Based on the CR value of 0.796 or CR ^{2} of 0.633, it can be concluded that 63.3% of the variation between the groups of provinces in Java and outside Java can be explained by the discriminant variables of trade openness, foreign investment, industrial sector output, population growth, and human development index.

Table II. **Tests of Equality of Group Means**

	Wilks' Lambda	F	df1	df2	Sig.
TRADE	.998	.472	1	229	.493
FDI	.591	158.752	1	229	.000
IND	.437	295.499	1	229	.000
POP	.978	5.263	1	229	.023
HDI	.823	49.197	1	229	.000

Third, compiling the discriminant function estimation equation. The equations can be arranged based on the output canonical discriminant function coefficient (Table 3). The discriminant function equations are as follows:

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Z = -8.586 + 2.22E-04 FDI + 1.00E-05 IND – 0.114 POP + 0.118 HDI or can be written in the form of an equation where the coefficients have been standardized based on the calculation of equation 2 (as follows):

D = 1.35E-03 FDI + 6.09E-05IND – 0.695POP + 0.719HDI

The variable of international trade openness is not a differentiating variable for the quality of the environment on Java and outside Java, therefore it is no longer included in the discriminant equation.

Table III. **Canonical discriminant function coefficients unstandardized coefficient**

Variable	Function
TRADE	-0.001
FDI	2.22E-04
IND	1.00E-05
POP	-0.114
HDI	0.118
constant	-8.587

Based on Wilk's Lamda value (Table 4) of 0.367 or the same as the chi-square of 227.329 with a significance at 0.000, the average discriminant score in the two groups of provinces of Java is the average discriminant score, and outside Java is significantly different. Although statistically, the difference between the two groups of provinces of Java and outside Java is significant, the difference is not significantly large. To test how big and meaningful the difference between provinces of Java and outside Java can be seen from the Square Canonical Correlation (CR^2).

Table IV. **Wilks' Lambda**

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.367	227.329	5	.000

Based on the CR value of 0.796 or CR ^{2} of 0.633 in Table 4, it can be concluded that 63.3% of the variation between the groups of provinces of Java and outside Java can be explained by the discriminant variables of trade openness, foreign investment, industrial sector output, population growth, and development index human.

Table V. *Eigenvalues*

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	1.728[a]	100.0	100.0	.796

Fourth, examining the contribution of each variable to form the discriminant function. The contribution of each variable in the discriminant function can be seen from standardized canonical discriminant function (Table 6). Standardized coefficients are used to assess the relative importance of discriminator variables in forming discriminant functions. The higher the standardized coefficient, the more important the variable is to other variables and vice versa. According to Table 6, industrial output has the most significant contribution as a variable that differentiates environmental quality in the provinces of Java and those outside Java at a value of 0.788 followed by a human development index of 0.468, foreign direct investment of 0.213, population growth of 0.179, and trade openness of 0.042.

Table VI. **Standardized canonical discriminant function coefficients**

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Variable	Function
TRADE	-0.042
FDI	0.213
IND	0.788
POP	-0.179
HDI	0.468

The structure matrix table (Table 7) is another way of indicating the relative importance of the predictors. The loading value of the discriminator variable is the correlation between the discriminant score and the discriminator variable, and the loading value is between +1 and -1. The closer to 1 the absolute value of loading is, the higher the commonality between the discriminant variable and the discriminant function and vice versa. Generally, just like a factor loading of 0.30 is seen as the cutt-off between important and less important variables. Accoring to Table 7, industrial output has the most significant contribution as a variable that differentiates environmental quality in the provinces of Java and those outside Java at a value of 0.864 followed by a foreign investment of 0.633, human development index of 0.353, population growth of 0.115, and trade openness of 0.035.

Tabel VII. **Structure Matrix**

	Function 1
TRADE	0.035
FDI	0.633
IND	0.864
POP	-0.115

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HDI	0.353

The contributions that differentiate environmental quality on Java and the other islands are industrial output, FDI, HDI, and population growth. The variable that does not make a difference is the trade openness of each research area. The variable FDI and industrial output differ between Java and the other islands because the foreign investment that enters Indonesia regarding mining and natural products is diverted to outside Java, while the industrial and manufacturing sector investment tends to enter Java. This finding is consistent with research by Ali (2020), Chandran and Tang (2013), and Zhang et al. (2020). In addition, the distribution range of industrial output in Java is much easier due to the relatively more complete infrastructure than what exists outside Java. This is a significant differentiator considering that the order of the highest differentiators is industrial output and FDI.

According to the Investment Coordinating Board, from 2014 to 2015, FDI in Indonesia increased by 20 percent (Sjöholm, 2016). Several factors driving the increase in FDI in Indonesia were energy consumption, trade openness, and the rupiah exchange rate (Djulius, 2017). The convenience is obtained when the regional government and the central government are open economically and to investment, namely the emergence of new job opportunities that can absorb labor, increased human resource capabilities, and broader market access because investment openness opens new markets in the surrounding area.

Furthermore, the HDI variable causes differences in environmental quality between Java and the other islands. The HDI factors in the aspects of health, education, and literacy. Several studies show that the more evenly distributed the facilities and infrastructure for education, health, and equitable

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access to public facilities are in an area, the better the HDI score; furthermore, adequate infrastructure that accommodates the community can rectify damage to the quality of the environment in the area (Dipeolu and Ibem, 2020; Hewitt *et al.*, 2019; Mamirkulova *et al.*, 2020; Shen *et al.*, 2020; Tomson *et al.*, 2021).

In BPS data, the local literacy rate in Java Island was above 90 in 2020, with the lowest rate found in East Java Province at 92.5 and the other islands having an average score above 92 except for Papua and West Nusa Tenggara Provinces (*Badan Pusat Statistik*, 2021). However, policymakers should note that infrastructure that does not pay attention to the AMDAL assessment will result in environmental damage. This means that not all excessive infrastructure will have a positive impact on society and the environment, such as initiating road infrastructure, which reduces land and forests as environmental ecosystems of flora and fauna (Bebbington *et al.*, 2018; Erbaugh *et al.*, 2020; Sloan *et al.*, 2018).

Unequal access and availability of facilities will exacerbate poverty, inequality and reduce government revenues. The population growth variable is the last differentiating factor between Java and outside Java. This is because the growth and population density on Java is much faster than on other islands. The increasing population growth will have an impact on the carbon footprint and the amount of CO2. Natural resources, energy consumption, and population are several factors that can affect environmental quality (Aslan *et al.*, 2018; Bildirici, 2017; Destek *et al.*, 2018).

According to Muryani and Pamungkas (2018), unemployment is a factor that affects national development and the level of social welfare. Unemployment has a relationship with the low capacity of human resources. This is also mentioned by Fahrika et al (2020) who state that the causes of the low quality of human resources include the poor conditions and quality of

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education. In a comparison between Java and other islands, there will be inequality that occurs, and it does not mean that this inequality cannot be anticipated with the indigenous values and culture of the community to continue to preserve the surrounding environment. An example of this happening was when the indigenous local values of the tribes outside Java (Tobelo and Sariga) and on the island of Java (Baduy) still uphold the values of environmental conservation. (Arifin et al., 2021; Donna et al., 2021; Saidiman et al., 2020).

The population is the weakest factor in influencing differences in environmental quality on Java and outside Java. It is the lowest on a numerical scale and has a negative symbol, which means that it does not have a differentiating impact on the environment on Java and outside Java. Meanwhile, if you look at previous research, an increasing population in one area will also worsen the quality of the environment in that area (Adams and Acheampong, 2019; Ohlan, 2015; Rahman, 2017; Rahman *et al.*, 2017). The quality of the environment is determined by carbon emissions, and one way to look at the factors driving the production of carbon emissions is population growth which includes urbanization, the age structure of the community, and the rate of population growth (Abdelfattah *et al.*, 2018; Chekouri *et al.*, 2020; Dimnwobi *et al.*, 2021; Li *et al.*, 2019; Wang, Wu, *et al.*, 2013). With this anomaly in the results, it is necessary to examine it through future research on population growth and urbanization and their relationship with the quality of life.

Conclusion

This research examines the factors that differentiate between Java and the other islands in terms of environmental quality in 33 provinces in Indonesia during the 2011-2017 period. This test is done by determining the variables that affect the environmental quality index—trade openness, industrial output, FDI,

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HDI, and population growth. The decisions about variable selection are based on the environmental quality index issued by the Indonesian Ministry of Environment and Forestry and from previous research. This research indicates that trade openness implemented in Java and on other islands does not make a difference in environmental quality in the two research areas. Other variables are factors that differentiate the environmental quality between Java and other islands.

Practical Implications

Although the difference between Java and the other islands can be reduced, it will take quite a long time to make changes on a massive scale, especially in the variables of industrial output, FDI, HDI, and population growth. There is a need for schemes and planning to determine environmentally friendly economic strategies to create equality between regions. Industry is the strongest variable that distinguishes between the environmental quality on Java and the other islands while GDRP is the largest contributor. Govenrment policy needs to develop industry so that it uses green technology innovation in order not to make trade-off between industry and environmental quality (Vural,2021 dan Kalayci, 2021) (Beşe and Kalayci, 2021; Vural, 2021).

Limitations and future research agenda

This study only identified the differentiators of environmental quality based on two categories for Java and the other islands of Indonesia. Subsequent research could examine more than two categories, especially the environmental quality categorization based very good, good, moderately good, poor and dangerous by using multiple discriminant analysis (MDA).

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What are the Factors that ~~Differentiate~~ Determine Differing Levels of Environmental Quality? Evidence from ~~the Island of~~ Java and ~~Non-Java~~Other Islands in Indonesia

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Abstract

Purpose – To identify ~~variable~~ variables that ~~distinguish~~ determine the differing levels of ~~environment~~ environmental quality ~~in~~ on Java and ~~Non-Java Island~~other islands in Indonesia.

Design/methodology/approach – ~~using~~ Using a quantitative approach, secondary data was sourced from the Central Statistics Agency and the Ministry of Environment and Forestry. ~~Methods of~~The data was obtained through the collection ~~by means~~ of documentation from 33 provinces in Indonesia. The analytical ~~tool~~ approach used ~~is~~ was discriminant analysis. The research variables are Trade Openness, Foreign Direct Investment (FDI), industry, HDI and population growth.

Findings – ~~Variables~~ The variables that distinguish between the levels of environmental quality in Indonesian provinces on the island of Java and ~~non-Java~~on other islands are ~~industry~~Industry, HDI, FDI, and population growth. The openness variable is not a differentiating variable for environmental quality. The most powerful variable as a differentiator of environmental quality ~~in~~ on Java Island and ~~Non-Java Island~~on other islands is the ~~Industrial~~ Industry variable

Research limitations/implications – This study has not classified the quality of the environment based on the ~~categories of the~~ Ministry of Environment and ~~Forestry~~Forestry's categories, namely the very good, good, quite good, poor, very poor and ~~alert~~dangerous ~~categories~~. For this reason, further research is needed using Multiple Discriminant Analysis (MDA).

Practical implications. – Industry is the variable that most strongly distinguishes between levels of environmental quality ~~in~~ on Java and ~~non-Java~~other island, while the industrial sector is the largest contributor to Gross Regional Domestic Product (GDRP). Government policy to develop green technology is ~~a must~~mandatory so that there is no trade off between industry and environmental quality.

Originality/value – ~~able~~ This study is able to identify the differentiating variables of environmental quality in two different groups, on Java and ~~Non-Java~~on the other islands of the Indonesian ~~territory~~archipelago.

Keywords – Environmental Quality, FDI, HDI, Industry, Population, discriminant analysis

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Introduction

The idea behind sustainable development is a concept that balances economic, social, and environmental factors. Development in developing countries, in general, ~~is~~ sees an ~~imbalanced~~ imbalance between high economic growth ~~with~~ and development in other fields, especially environmental factors. However, implementation development in Indonesia has not been optimal. ~~The~~ Its success ~~of the development~~ is seen ~~from~~ in terms of economic indicators ~~imbalance~~ being out of balance with other development indicators, especially environmental indicators (Fauzi and Oktavianus, 2014). The imbalance between economic and environmental development in Indonesia is visible in the contrats between the island of Java and ~~non-Java~~the other islands (sometimes referred to as non-Java islands). The imbalance between economic, social, and environmental development mainly occurs ~~in~~ on Java ~~Island~~, which can be seen from the inter-island environmental quality index (IKLH). ~~Based on~~According to the IKLH in 2010-2019, Java ~~Island is~~was ~~in~~ the ~~the~~ lowest ~~rank~~ ranked island compared to the other islands in Indonesia, with an average of 52 points, ~~non-Java~~while other islands (Papua, Maluku, Sulawesi, Kalimantan, Bali ~~&~~ and Nusa Tenggara, and Sumatra) had an average of 82 points. Based on the ~~IKLH~~ IKLH's ~~category~~categorization, ~~the amount of~~a score on the index that is above 80 is considered very good, while 50 < **IKLH** ≤ 60 is considered not good (*Kementerian Lingkungan Hidup dan*

Kehutanan, 2020). According to the IKLH ~~categorycategories~~, ~~it means thatthe~~ average environmental index ~~in~~ on Java ~~islands areis~~ generally good whereas ~~in Non-Javaon the other island~~ islands the indexes are not too good.

The difference in environmental quality ~~difference~~ between Java and ~~Non-Java other island~~ islands is an important phenomenon to be ~~conducted in a researchhed as to the latestin~~ the context of the current plan ~~of movingto~~ move the capital city of Indonesia based on Law ~~noNo.~~-3 of 2022 concerning the State Capital ~~where~~ which relates to the capital city of Indonesia ~~is~~ being located on the island of Kalimantan (~~Non~~ and no longer on Java~~a island~~) ~~which~~ whose predicate, based on the IKLH, is very good. Some researchers have explained that the reasons behind relocating ~~moving a~~the capital ~~relocation~~ are population density, environmental degradation, and ~~city~~ urban inconvenience (Rachmawati *et al.*, 2021). Relocation o~~Capital~~ f the capital ~~relocation~~ will have its own ~~consequence~~ consequences ~~towards~~ for environment in the future. A city that has fewer citizens will ~~grown~~ grow into a metropolitan area. Conflict between economic growth, social, and environment will continue to happen (Buchori *et al.*, 2017, 2020; Buchori and Sugiri, 2016; Chen *et al.*, 2017; Sugiri *et al.*, 2011; United Nations, 2014). The outlook is that, by identifying the aspects that distinguish between ~~environment~~ environmental quality ~~in~~ on Java and ~~Non~~ on islands other than Java ~~island~~, the results can become the basis for making decisions so that the quality of the environment on the other island ~~of Non-Java islands~~(Kalimantan) remain very good despite the capital relocation.

Another reason that ~~distinguish~~ distinguishes between the environmental quality in Java and ~~Non-Java~~the other islands of Indonesia is the conditions affecting ~~the two islands~~them are very different and unique. The contribution to Gross Regional Domestic Product (GDRP) ~~contribution in~~by

Java and ~~Non-Java~~the other islands and ~~on~~ to Gross National Product (GNP) are distinct. The contribution of the industrial sector ~~in~~ to GDRP is very different due to ~~differences~~ contrasts between ~~in~~ the facilities and infrastructure. ~~Both~~ Java and ~~Non-Java~~the other islands ~~have~~ are different in terms of population density. The denser the population, the worse the environmental quality (Oktavilia *et al.*, 2019; Pujiati *et al.*, 2018, 2019; Pujiati and Imron, 2020). The increasing population, the need for transportation, land, food cause the quality of the environment to decline (Chowdhury and Hossain, 2018; Malthus, 1798; Musse *et al.*, 2018).

There are some factors that can intervene in ~~the~~ terms of environmental quality such as GDRP, energy consumptiom, population growth, literacy, urbanization rate, and foreign direct investment (FDI) (Fakher and Abedi, 2017; Fakher, 2019; Hao *et al.*, 2018). FDI has a positive impact on environmental quality in developing countries but does not apply in developed countries. Trade openness can reduce the impact of carbon emissions in developed countries but does not apply in developing countries ~~FDI~~ (Khan *et al.*, 2021). Economic growth, especially in developing countries, is the reason for the decline in environmental quality (Mukhopadhyay and Pani, 2022). The other influencing factor is HDI. Evironmental performance and HDI are positively ~~correlate~~ correlated in both ~~in~~ developed and developing countries (Hickel, 2020; Lai and Chen, 2020).

Trade openness benefits the community and the state in terms of foreign exchange, but if there is no trade restriction regulation, it causes the entry of low-quality and high-emission energy consumption goods, thereby increasing carbon emissions. (Acheampong et al., 2019; Coskuner et al., 2020; Kwakwa, 2020). There ~~is a~~are different ~~point~~ points of view ~~between~~ regarding trade and environmental quality (Esmaeilpour Moghadam and

Dehbashi, 2018; Fakher and Abedi, 2017; Soylu et al., 2021), where trade can be seen as ~~damage~~ damaging the environment or ~~have~~ as having ~~more~~ the effect ~~on~~ of improving environmental quality (Chen and Hu, 2020; Xie and Wu, 2021).

The industrial sector's contribution, which dominates ~~in~~ the GDRP, on the one hand increases economic development and the other hand decreases environmental quality. Most of it is generated from the industrial sector's contribution, which harms environmental quality such as water pollution, air pollution, land pollution, and land conversion. Industry plays a vital role in environmental and ecosystem damage in an area (Shahabadi *et al.*, 2017). Industry's role in the era of globalization, with ~~the~~ increasingly open international trade, cannot be avoided. Vural (2021) states that economic development can increase innovation and produce new inventions to build more environmentally friendly resources. The theory that explains the relationship between industry and the environment can be explained through the Environmental Kuznet Curve (EKC) theory.

Lau et al (2018) ~~in~~ studied 100 developed and developing countries to ~~look at~~examine the EKC hypothesis based on the quality of institutions, resulting in the conclusion that there is an inverse U-relationship ~~on~~ with economic growth and carbon dioxide emissions in developed countries ~~and~~ which is not found in developing countries. Sarkodie and Strezov (2018) found that the driving factor for carbon emissions in developed and developing countries is the economy based on agriculture, transportation, and services, paradigm shifting, and structure ~~on~~ in industries in Australia, China, Ghana, and the USA in 1971-2013.

The population also influences the quality of the environment. The more the population increases, the more needs there are that must be met,

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including housing, transportation, goods, and services. According to Todaro (2000), population spikes have resulted in environmental degradation or the erosion of minimal natural resources. Exploitation activities that are not ~~accompanied~~ guided by environmental management can reduce the availability of limited resources. Population density, energy and mining activity, and fossil exploration can increase CO2 production (Heidari *et al.*, 2015; Jebli *et al.*, 2017; Wang *et al.*, 2018; Yahaya and Hussaini, 2020). The increase in population will increase the demand for land clearing for housing (Ohlan, 2015; Rahman, 2017).

The quality of the population can be seen from the human development index. The ability of human resources ~~in~~ to engage in the production process will determine the results, which will later become the endowment factor of a country's comparative advantage. The higher the HDI value in an area, the better the quality of human ~~beings in that area can be good~~resources there. Increased knowledge and ~~length~~ duration of ~~study~~education, income per capita, and health are essential factors in preserving the environment (Shahabadi et al., 2017). Increasing human capabilities can be used as capital in processing resources to be more efficient and produce ~~output~~ outputs that ~~is~~ are more environmentally friendly.

There are still differences ~~in~~ between the research results related to factors that affect environmental quality, the openness factor, FDI, Industry, Population and HDI which ~~is~~ are currently unavoidable by countries globally; it is crucial to research factors that affect environmental quality.The difference between this and previous research is that previous research tends to focus on HDI as the indicator variable ~~HDI~~. Previous research has examined the HDI indicators separately such as levels of ~~Education~~education, ~~Health~~ health and literacy ~~levels~~. ~~Indicator~~ Indicators ~~its~~ of impact on the environment, such as

education (Garnawat *et al.*, 2017; Imamoglu, 2018; Mujan *et al.*, 2019; Vilcekova *et al.*, 2017), health (Alola and Kirikkaleli, 2019; Zomorrodi and Zhou, 2017), as well as literacy rates (Musse *et al.*, 2018) ~~with~~ on environmental quality. Arisman (2018) found that HDI reflects the quality of HR by showing the fixed effect model on population and GDP per capita affects HDI rankings in ASEAN countries.

The novelty that the researcher is ~~trying~~ seeking to present is regarding the views that exist on the island of Java and ~~non-Java~~on the other islands are attached to variables that can affect the ability of the region to be more responsive to the environment ~~around~~ related to them using secondary data with coverage throughout Indonesia. ~~Discriminant~~ The discriminant analysis tool ~~with~~ has two categories~~, ~~;~~~ the first~~, as~~ is the dependent variable, namely the quality of the environment ~~in~~ on Java and ~~non-Java~~on other islands, which can provide a more detailed and helpful discussion for policymaking. Discriminant analysis is used to identify two different groups (Stella, 2019) for example, based on the category of loyal and non-loyal consumers (Isliko, 2016), and based on economic status (strong or weak) (Egbo and Bartholomew, 2017). This research aims to identify what factors differentiate between the levels of ~~the~~ environmental quality of provinces ~~in~~ on the island of Java and ~~non-Java~~on the other islands.

Literature Review

Impact of Trade ~~openness~~ Openness on Environmental Quality

Trade openness has a connection and will influence FDI (Burange et al., 2019; Djulius, 2017; Makoni, 2018; Rakshit, 2022; Rathnayaka Mudiyanselage et al., 2021). Kumari et al (2021) found that there was a long

term causal connection between FDI, trade openness, and economic growth in India and FDI and trade openness influenced both ways.

Trade openness and FDI in a country where ~~it~~ investment circulates will influence the whole ecosystem (Le et al., 2016; Oktavilia and Firmansyah, 2016; Tran and Do, 2021). ~~This~~ This idea ~~brought up about~~lead to the hypotheses ~~the~~ of pollution halo and pollution haven ~~hypotheses on~~ through the EKC. According to Tran and Do (2021), trade openness and FDI caused ~~environment~~ environmental degradation in Malaysia and Indonesia in the long term but not in Thailand. Le et al. (2016) found that trade openness impacted positively in high-income countries, but had a ~~negatively~~ negative impact ~~on~~ in low and middle income countries. Sajid et al. (2020) found that by using trade openness, FDI, and institution performance as variables ~~on~~ influencing the environment found that there ~~wa~~ was a positive relationship ~~towards~~ between trade openness and urbanization ~~on~~ in terms of the ecological footprint but found no relationship ~~towards~~ with institution performance.

Impact of FDI on Environmental Quality

Simon Kuznets, ~~through~~ using his Environment Kuznets Curve, stated that economic activity will destroy the environment but when the income increases, the demand for ~~environment~~ environmental treatment will rise ~~as~~ with the availability of sources of investment ~~source~~ (Isiksal, 2021; Isiksal et al., 2019). The validity of EKC ~~happened~~ was demonstrated in Indonesia and China (Sarkodie and Strezov, 2019)

In another theory, investment-based economic growth is tested with two hypotheses, namely the pollution haven hypothesis and the pollution halo hypothesis (Adeel-Farooq et al., 2021). The two hypotheses are still closely

related to the EKC: ~~where~~ the pollution haven hypothesis states that tighter environmental policies at home and looser ones abroad cause developed countries to move industries that harm the environment to more developed countries, causing developing countries to become "pollution havens"~~.~~ ~~"~~for pollution-intensive industries (Bulus and Koc, 2021; Guzel and Okumus, 2020; Sarkodie and Strezov, 2019; Singhania and Saini, 2021; Ur Rahman et al., 2019). On the other hand, developed countries transfer technological progress, environment-based FDI, and better environmental standards to developing countries which are incorporated into the pollution halo hypothesis, so that FDI from developed countries can improve environmental quality in developing countries (Balsalobre-Lorente et al., 2019; Mert and Caglar, 2020; Oktavilia et al., 2019; Pujiati, Oktavilia, et al., 2020).

The Impact of Industry on Environmental Quality

According to Febriana (2019), the production process in the industrial sector produces liquid and solid waste that can pollute the environment. ~~It~~ This is endorsed by Shahabadi (2017) ~~which~~ who explains that industrial activities will increase the use of vehicles that produce emissions in the air and the disposal of waste that can harm ecosystems in an area. The study was supported by Cui et al. (2020) ~~which~~ who ~~states~~ state that industrial growth causes environmental damage. However, according to Fibrianto (2018), an increase in activity in the industrial sector will increase a country's GDP revenue, and this will affect the increase in financing for environmental management ~~financing~~.

The Impact of Population on Environmental Quality

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According to Han et al. (2018) and Pujiati et al. (2020), ~~found that~~ human population plays an important role in increasing PM2.5 pollution. In his research, Ghanem (2018) ~~in his research~~ found that an increase of one percent of the population led to a 2.4 percent increase in pollution and an increase in pollution caused a decrease in health which led to a decrease in labor productivity. Population has other impacts besides the environment including poverty and economic growth. Nabi et al. (2020) found that there is a positive relationship between poverty levels and carbon emissions in 98 developed and developing countries.

The Impact of HDI on Environmental Quality

Using the HDI (Human Development Index) is one way to ~~see~~ view the quality of human life in a country based on life expectancy, education, and health. Several studies have shown that life expectancy, education, and health are influenced by the quality of the environment (Ghanem, 2018; Han et al., 2018; Hossain and Chen, 2021; Joof and Isiksal, 2021; Nabi et al., 2020). According to Ladi et al. (2021), ~~Water~~ water quality can have an effect on HDI. Li and Xi (2021) studied the Environmental Damage Index (EDI) and HDI in provinces in China found that environmental damage causes a delay in economic growth and every 0.01 percent increase in environmental damage reduces GDP by 3.15 percent.

Methods

Type and Source of Data

This ~~research~~ study uses a quantitative research approach. The data used are secondary data sourced from the Central Statistics Agency and the Ministry of Environment and Forestry. The analytical ~~tool~~ method is ~~in the~~

form of discriminant analysis. Discriminant analysiswhich is used to build predictive models for each group. In this research, two groups are studied: the a group of provinces included in the group of provinceslocated in on the island Java and a group of provinces non-Java on other islands (outside Java). Discriminant Analysis requires a combination of linear derivatives between two or more variables that will discriminate against each other through the groups that have been builtdeveloped. (Keskin et al., 2020). A simple linear discriminant function converts the sample size to the discriminant value (Ismail et al., 2016).

Variables and operational definitions

The variables used are the environmental quality index (IKLH), trade openness (TO), foreign investment (FDI), industrial output (IND), population growth (POP), and Human Development Index (HDI) in 33 provinces in Indonesia. IKLH is measured by using three components of thecomprising indexes for water quality index, air quality, and land cover with units expressed as a percentage unit. Trade openness (TO) is measured by adding the number of exports and imports divided by GDRP in as a percentpercentage. FDI is measured by direct investment invested by foreign parties in units of USD million millionsUS$. IND is measured by the total output contribution of the industrial sector to GDRP in billions of rupiah. POP is measured by calculating the change in population with compared to the previous year in percentage. HDI is measured from education, health, and a decent standard of living in an index expressed as units.

Model and Analysis Steps

The equation for the estimation of the discriminant function in the two groups in this study uses the discriminant model (Hair, 1998; Vazquez-Brust and Plaza-úbeda, 2021; Wang, Zou, et al., 2013):

$Zjk = a + W_1X_{1k} + W_2X_{2k} + ... + W_nX_{nk}$ .....(1)

Noted as:

Zjk = discriminant Z score of discriminant function j for object k

A = intercept

W*i* = discriminant weight for independent variable *i*

X*i*k = independent variable *i* for object

Or the discriminant function equation can be calculated from the standardized value as follows:

Dj = DI1Z1 + DIZz2 + ….. + dipzp …….. (2)

An individual's standardized score on the *i*-th discriminant function (D*i*) is found by ~~ultiplying~~ multiplying the standardized score on each predictor (z) by its standardized discriminant function coefficient (d*i*) and then adding the products for all predictors (Stella, 2019).

Commented [W71]: ?

To test whether there is a significant difference between the two groups in Java and non-Java, it can be done using the Wilk's Lambda test statistic and can be converted into an F ratio. If the significance of the F ratio <0.05 then the discriminant variable can be used to form the discriminant model and vice versa. The reason for using Wilk's Lambda as a test in discriminant analysis is because the method used is robust (Alrawashdeh and Radwan, 2017).

To test the differences between the two groups of environmental quality in Java and outside Java for all variables, the Chi-Square was used together. If the Chi-square significance value is <0.05, then the discriminant functions for the two groups are significantly different and vice versa. The next step is to test how big and meaningful the difference between the two groups is can be seen from the value of the square canonical correlation (CR^2). CR^2 is identical to R^2 in the regression that measures the variation between the

two groups of environmental quality in Java and Non-Java which can be explained by discriminant variables.

Result and Discussion

This section will identify factors that ~~differentiate~~ determine the different quality of the environment in provinces ~~in~~ of Java and ~~non-Java~~on other islands. There are several stages of analysis, the first being descriptive statistics. ~~Based on~~According to descriptive statistics, the average trade openness, foreign investment, industrial sector output, population growth, and human development index in provinces of Java ~~Island Province~~ (code 1) ~~is~~ are higher than in ~~Provinces~~ provinces outside Java ~~Island~~ (code 0). ~~It~~ These even ~~exceeds~~ exceed the average in Indonesia (Table 1). Foreign investment and the output of the industrial sector in the ~~province~~ provinces of Java ~~Island~~ are very different. Foreign investment in Java Island averaged ~~$~~USD 2,517 million, ~~Provinces~~ whereas provinces outside Java avergaed $USD 451 million, and ~~Provinces~~ provinces in Indonesia ~~an~~ averag~~e~~ed ~~of~~ $USD 826 million. This shows that better infrastructure and facilities in the provinces of Java ~~Island Province~~ are more attractive for foreign investors. The average foreign investment is in line with the average contribution of industrial output to GDRP.

Table I. **Average Trade, FDI, Industry, Population Growth and Human Development Index ~~in the~~on Java ~~Island~~ (1) and ~~non-Java Island~~outside Java (0)**

~~PULAU~~ISLAND		Mean
0	TRADE	50.1516

	FDI	451.0960
	IND	22507.5365
	POP	2.0526
	HDI	67.1203
1	TRADE	55.1307
	FDI	2517.0024
	IND	243102.3479
	POP	1.4357
	HDI	71.8652
Total	TRADE	51.0569
	FDI	826.7154
	IND	62615.6840
	POP	1.9404
	HDI	67.9830

Second, the test of equality of group means all variables FDI, IND, POP, HDI are significant other than the trade openness variable. This test shows that in addition to trade openness, it can be used to form the discriminant variable because the significance value is >0.05 or 0,493 (Table 2). Wilk's Lambda test was used. Based on the CR value of 0.796 or CR^2 of 0.633, it can be concluded that 63.3% of the variation between the groups of provinces in Java and ~~non-~~outside Java can be explained by the discriminant variables of trade openness, foreign investment, industrial sector output, population growth, and human development index.

Table II. **Tests of Equality of Group Means**

	Wilks' Lambda	F	df1	df2	Sig.
TRADE	.998	.472	1	229	.493
FDI	.591	158.752	1	229	.000
IND	.437	295.499	1	229	.000
POP	.978	5.263	1	229	.023
HDI	.823	49.197	1	229	.000

Third, ~~compile~~ compiling the discriminant function estimation equation. The equations can be arranged based on the output canonical discriminant function coefficient (Table 3). The discriminant function equations are as follows:

Z = -8.586 + 2.22E-04 FDI + 1.00E-05 IND – 0.114 POP + 0.118 HDI

or can be written in the form of an equation where the coefficients have been standardized based on the calculation of equation 2 (as follows):

D = 1.35E-03 FDI + 6.09E-05IND – 0.695POP + 0.719HDI

The variable of international trade openness is not a differentiating variable for the quality of the environment ~~in~~ on Java and ~~non~~ outside Java, therefore it is no longer included in the discriminant equation.

Table III. **Canonical discriminant function coefficients unstandardized coefficient**

Variable	Function
TRADE	-0.001
FDI	2.22E-04
IND	1.00E-05
POP	-0.114
HDI	0.118
constant	-8.587

Based on Wilk's Lamda value (Table 4) of 0.367 or the same as the chi-square of 227.329 with a significance at 0.000, the average discriminant score in the two groups of provinces ~~in~~ of Java is the average discriminant

score, and ~~non-~~outside Java is significantly different. Although statistically, the difference between the two groups of provinces ~~in~~ of Java and ~~non-~~outside Java is significant, the difference is not significantly ~~too big~~large. To test how big and meaningful the difference between provinces ~~in~~ of Java and ~~non-~~outside Java can be seen from the Square Canonical Correlation (CR ^{2}).

Table IV. **Wilks' Lambda**

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.367	227.329	5	.000

Based on the CR value of 0.796 or CR ^{2} of 0.633 ~~pada~~ in Table 4, it can be concluded that 63.3% of the variation between the groups of provinces ~~in~~ of Java and ~~non-~~outside Java can be explained by the discriminant variables of trade openness, foreign investment, industrial sector output, population growth, and development index human.

Table V. *Eigenvalues*

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	1.728[a]	100.0	100.0	.796

Fourth, ~~take a look at~~examining the contribution of each variable to form the discriminant function. The contribution of each variable in the discriminant function can be seen from ~~standardize~~ standardized canonical discriminant function (Table 6). Standardized coefficients are used to assess the relative importance of discriminator variables in forming discriminant functions. The higher the standardized coefficient, the more important the variable is to other variables and vice versa. ~~In~~ According to Table 6,

industrial output has the most significant contribution as a variable that differentiates environmental quality in the ~~Provinces~~ provinces of Java ~~Island~~ and ~~non~~ those outside Java ~~Island~~ at a value of 0.788 followed by a human development index of 0.468, foreign direct investment of ~~-~~0.213, population growth of 0.179, and trade openness of 0.042.

Table VI. ~~standardized~~ **Standardized canonical discriminant function coefficients**

Variable	Function
TRADE	-0.042
FDI	0.213
IND	0.788
POP	-0.179
HDI	0.468

The structure matrix table (Table 7) ~~it~~ is another way of indicating the relative importance of the predictors. The loading value of the discriminator variable is the correlation between the discriminant score and the discriminator variable, and the loading value is between +1 and -1. The closer to 1 the absolute value of loading is, the higher the commonality between the discriminant variable and the discriminant function and vice versa. Generally, just like a factor loading of 0~~,~~.30 is seen as the cutt-off between important and less important ~~variable~~variables. ~~In~~ Accoring to Table 7, industrial output has the most significant contribution as a variable that differentiates environmental quality in the ~~Provinces~~ provinces of Java ~~Island~~ and ~~non~~ those outside Java ~~Island~~ at a value of 0.864 followed by a foreign investment of 0.633, human

development index of 0.353, population growth of 0.115, and trade openness of 0.035.

Tabel VII. **Structure Matrix**

	Function 1
TRADE	0.035
FDI	0.633
IND	0.864
POP	-0.115
HDI	0.353

The contributions that differentiate environmental quality ~~in~~ on Java and ~~Non-Java~~the other islands are industrial output, FDI, HDI, and population growth. The variable that does not make a difference is the trade openness of each research area. The variable FDI and industrial output differ between Java and ~~Non-Java~~the other islands because the foreign investment that enters Indonesia regarding mining and natural products is diverted ~~non-~~to outside Java, while the industrial and manufacturing ~~sectors~~ sector investment ~~tend~~ tends to enter Java. This finding is consistent with research ~~from~~ by ~~(~~Ali~~,~~ (2020~~;~~), Chandran and Tang~~,~~ (2013~~;~~), and Zhang et al.~~,~~ (2020). In addition, the distribution range of industrial output in Java is much easier due to the relatively more complete infrastructure than ~~infrastructure~~ what exists outside ~~non-~~Java. This is a significant differentiator considering that the order of the highest differentiators is industrial output and FDI.

According to the Investment Coordinating Board, from 2014 to 2015, FDI in Indonesia ~~has~~ increased by 20 percent (Sjöholm, 2016). Several factors driving the increase in FDI in Indonesia ~~are~~ were energy consumption, trade

openness, and the rupiah exchange rate (Djulius, 2017). The convenience is obtained when the regional government and the central government are open economically and to investment, namely the emergence of new job opportunities that can absorb labor, increased human resource capabilities, and broader market access because investment openness opens new markets in the surrounding area.

Furthermore, the HDI variable ~~provides~~ causes differences in environmental quality between Java and ~~Non-Java~~the other islands. The ~~Human Development Index~~HDI ~~represents~~ factors in the aspects of health, education, and literacy. Several studies show that the more evenly ~~an area has~~distributed the facilities and infrastructure for education, health, and equitable access to public facilities are in an area, the better the HDI score~~,~~ ~~and~~ furthermore, adequate infrastructure that accommodates the community can rectify damage to the quality of the environment in the area (Dipeolu and Ibem, 2020; Hewitt *et al.*, 2019; Mamirkulova *et al.*, 2020; Shen *et al.*, 2020; Tomson *et al.*, 2021).

In BPS data, the local literacy rate in Java Island ~~is~~ was above 90 in 2020, with the lowest rate found in East Java Province at 92.5 and ~~non-Java~~the other islands having an average score above 92 except for Papua and West Nusa Tenggara Provinces (*Badan Pusat Statistik*, 2021). However, policymakers should note that infrastructure that does not pay attention to the AMDAL assessment will result in environmental damage. ~~That~~ This means that not all excessive infrastructure will have a positive impact on society and the environment, such as initiating road infrastructure, which reduces land and forests as environmental ecosystems of flora and fauna (Bebbington *et al.*, 2018; Erbaugh *et al.*, 2020; Sloan *et al.*, 2018).

Commented [W72]: ???

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Unequal access and availability of facilities will exacerbate poverty, inequality and reduce government revenues. The population growth variable is the last differentiating factor between Java and ~~Non-Java~~outside Java. This is because the growth and population density ~~in~~ on Java is much faster than ~~in Non-Java~~on other islands. The increasing population growth will have an impact on the carbon footprint and the amount of CO2. Natural resources, energy consumption, and population are several factors that can affect environmental quality (Aslan *et al.*, 2018; Bildirici, 2017; Destek *et al.*, 2018).

According to Muryani and Pamungkas (2018), ~~Unemployment~~ unemployment is a factor that affects national development and the level of social welfare. Unemployment has a relationship with the low capacity of human resources. This is also mentioned by Fahrika et al (2020) ~~which~~ who ~~states~~ state that ~~one of~~ the causes of the low quality of human resources ~~is~~ include the poor ~~situation~~ conditions and quality of education. In a comparison between Java ~~Island~~ and ~~Non~~ other islands~~Java Islands~~, there will be inequality that occurs, and it does not mean that this inequality cannot be anticipated with the ~~noble~~indigenous values and culture of the community to continue to preserve the surrounding environment. An example of ~~what~~ this ~~happened~~ happening ~~is~~ was ~~that~~ when the ~~noble~~indigenous local values of the tribes outside Java (Tobelo and Sariga) and on the island of Java (Baduy) still uphold the values of environmental conservation. (Arifin et al., 2021; Donna et al., 2021; Saidiman et al., 2020).

The population is the ~~lowest~~ weakest factor in influencing differences in environmental quality ~~in~~ on Java and ~~non~~ outside Java. It is the lowest on a numerical scale and has a negative symbol, which means that it does not have a differentiating ~~quality~~ impact on the environment ~~in~~ on Java and ~~non~~ outside Java. ~~Whereas~~ Meanwhile, if you look at previous research, an increasing

population in one area will also worsen the quality of the environment in that area (Adams and Acheampong, 2019; Ohlan, 2015; Rahman, 2017; Rahman *et al.*, 2017). The quality of the environment is determined ~~from~~ by carbon emissions, and one way to look at the factors driving the production of carbon emissions is population growth which includes urbanization, the age structure of the community, and the rate of population growth (Abdelfattah *et al.*, 2018; Chekouri *et al.*, 2020; Dimnwobi *et al.*, 2021; Li *et al.*, 2019; Wang, Wu, *et al.*, 2013). With ~~the~~ this anomaly in the results, it is necessary to examine it through future research on population growth and urbanization and their relationship with the quality of life.

Conclusion

This research examines the factors that differentiate between Java and ~~Non-Java Islands~~the other islands in terms of environmental quality in 33 provinces in Indonesia ~~in~~ during the 2011-2017 period. This test is done by determining the variables that affect the environmental quality index—trade openness, industrial output, FDI, HDI, and population growth. The decisions ~~Variable~~ about variable selection ~~decisions~~ are based on the environmental quality index issued by the Indonesian Ministry of Environment and Forestry and from previous research. This research indicates that trade openness implemented in Java and ~~Non-Java~~on other islands does not make a difference in environmental quality in the two research areas. Other variables are factors that differentiate the environmental quality between Java and ~~Non-Java~~other islands.

Practical Implications

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Although the difference between Java and ~~Non-Java~~the other islands can be reduced, it will take quite a long time to make changes on a massive scale, especially in the variables of industrial output, FDI, HDI, and population growth. ~~The~~ There is a need for schemes and planning ~~in to determining~~ determine environmentally friendly economic strategies to create equality between regions. Industry is the strongest variable that ~~distinguish~~ distinguishes between the environmental quality ~~between~~ on Java and ~~Non-Java Island~~the other islands while GDRP is the largest contributor. Govenrment policy ~~need~~ needs to develop industry ~~is to use~~so that it uses green technology innovation ~~as to~~in order not to make trade-off between industry and environmental quality (Vural,2021 dan Kalayci, 2021) (Beşe and Kalayci, 2021; Vural, 2021).

Limitations and future research agenda

This study only identified the differentiators of environmental quality based on two categories~~,~~ for Java and ~~non-Java~~the other islands of Indonesia. Subsequent research ~~can~~ could examine more than two categories, especially the environmental quality ~~categories~~ categorization based ~~on such as~~ very good, good, moderately good, poor and ~~alert~~ dangerous by using multiple discriminant analysis (MDA).

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ISLAND		Mean
0	TRADE	50.1516
	FDI	451.0960
	IND	22507.5365
	POP	2.0526
	HDI	67.1203
1	TRADE	55.1307
	FDI	2517.0024
	IND	243102.3479
	POP	1.4357
	HDI	71.8652
Total	TRADE	51.0569
	FDI	826.7154
	IND	62615.6840
	POP	1.9404
	HDI	67.9830

Management of Environmental Quality

	Wilks' Lambda	F	df1	df2	Sig.
TRADE	.998	.472	1	229	.493
FDI	.591	158.752	1	229	.000
IND	.437	295.499	1	229	.000
POP	.978	5.263	1	229	.023
HDI	.823	49.197	1	229	.000

Management of Environmental Quality

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	1.728[a]	100.0	100.0	.796

Management of Environmental Quality

Variable	Function
TRADE	-0.001
FDI	2.22E-04
IND	1.00E-05
POP	-0.114
HDI	0.118
constant	-8.587

Management of Environmental Quality

Variable	Function
TRADE	-0.042
FDI	0.213
IND	0.788
POP	-0.179
HDI	0.468

Management of Environmental Quality

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.367	227.329	5	.000

Management of Environmental Quality

	Function 1
TRADE	0.035
FDI	0.633
IND	0.864
POP	-0.115
HDI	0.353

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Nama/*Name* :

Alamat/*Address* :

Telepon/*Phone* :

Kota/*City* : Negara/*Country* :

Bank Penerima/*Beneficiary Bank* :

Kota/*City* : Negara/*Country* :

No. Rek./*Acc. No.* :

Pengirim/*Remitter* ☐ Penduduk/ *Resident* ☐ Bukan Penduduk/ *Non Resident*

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Nama Alias/*Alias Name* :

No. ID :

KTP/SIM/*Passport*/KITAS

Alamat/*Address* :

Telepon/*Phone* :

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Tujuan Transaksi (*Transaction Purpose*) :

Berita (*Message*) :

Biaya dari Bank koresponden dibebankan ke rekening/
Correspondent bank charges are for account of :

☐ Penerima/*Beneficiary* ☐ Pengirim/*Remitter* ☐ *Sharing*

Jenis Pengiriman/ *Type of Transfer* ☐ LLG/*Clearing* ☐ RTGS ☐ Draft ☐ SWIFT

Sumber Dana/ *Source of fund*

☐ Tunai/*Cash* ☐ Cek/*BG No.*

☐ Debit Rek./*Debit Acc. No.*

Mata Uang/*Currency* : ☐ IDR ☐ USD ☐

Jumlah Dana yang dikirim/*Amount Transfer* :

Jumlah/*Amount*	Kurs/*Rate*	Nilai/*Total Amount*
2495	GBP	2495

Biaya/*Charge*	Valas/*Amount in Foreign Exchange*	Kurs/ *Amount*	Nilai/ *Total Amount*
Komisi/*Commision*			
Pengiriman/*Handling*			
Bank Koresponden/*Correspondent Bank*			
Jumlah Biaya/*Amount Charge* :			
Total yang dibayarkan/*Total Amount* :			

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- Transaksi oleh Walk In Customer (WIC) di atas Rp 100 juta atau nilai yang setara dengan itu wajib mengisi form PMN (KYC)/*Transaction by Walk In Customer amounting exceeds Rp 100,000,000 (one hundred million rupiahs) or equivalent value must fill in the PMN (KYC) Form*
- Transaksi oleh bukan penduduk di atas USD 10.000 atau ekuivalen wajib mengisi Form LLD1/*Transactional by non resident amounting over US $ 10,000 or its equivalent must fill in LLD1 Form*

Lembar 1 & 2 : u/ Bank; Lembar 3 : u/ Nasabah

PT. BANK NEGARA INDONESIA (Persero), Tbk
CABANG : SEMARANG

IBOC - Maintenance (S1

Teller ID : 81360
Date : 07/10/2022
Time : 10:13:00

Sender's Reference:
:20:S10SMG00257822
Bank Operation Code:
:23B:CRED
Value Date/Currency/Interbank Settled Amount:
:32A:221007GBP2495,
Ordering Customer:
:50K:/233516779
AMIN PUJIATI
WEST LAMONGAN STREET 111 NO 38
SEMARANG INDONESIA
Ordering Institution:
:52A:BNINIDJAXXX
Account With Institution:
:57D:BARCLAYS BANK PLC
MANCHESTER UNITED KINGDOM
SWIFT CODE BARCGB22XXX
Beneficiary Customer:
:59:/GB94BARC20119940508470
EMERALD GROUP PUBLISHING
HOWARD HOUSE WAGON LANE
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:70:JOURNAL PUBLISHING
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:71A:OUR

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REFERENCE : S10SMG00257822

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07-Oct-22

Dear Amin Pujiati,

This letter is to confirm that your paper "What are the Factors that Determine Differing Levels of Environmental Quality? Evidence from Java and Other Islands in Indonesia" has been accepted for publication in Management of Environmental Quality**.** Your article will be published online as an individual article in the first instance, and later compiled in a volume and issue.

I would like to thank you for your contribution to the journal, on behalf of Emerald Publishing and the editorial team of Management of Environmental Quality**.**

Best regards,

Dipti Chawathe

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https://www.emerald.com/insight/1477-7835.htm

What are the factors that determine differing levels of environmental quality? Evidence from Java and other islands in Indonesia

Received 17 February 2022
Revised 21 July 2022
Accepted 11 September 2022

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Abstract

Purpose – This paper aims to identify variables that determine the differing levels of environmental quality on Java and other islands in Indonesia.

Design/methodology/approach – Using a quantitative approach, secondary data were sourced from the Central Statistics Agency and the Ministry of Environment and Forestry. The data were obtained through the collection of documentation from 33 provinces in Indonesia. The analytical approach used was discriminant analysis. The research variables are Trade Openness, Foreign Direct Investment (FDI), industry, HDI and population growth.

Findings – The variables that distinguish between the levels of environmental quality in Indonesian provinces on the island of Java and on other islands are Industry, HDI, FDI and population growth. The openness variable is not a differentiating variable for environmental quality. The most powerful variable as a differentiator of environmental quality on Java Island and on other islands is the Industry variable.

Research limitations/implications – This study has not classified the quality of the environment based on the Ministry of Environment and Forestry's categories, namely, the very good, good, quite good, poor, very poor and dangerous. For this reason, further research is needed using multiple discriminant analysis (MDA).

Practical implications – Industry is the variable that most strongly distinguishes between levels of environmental quality on Java and other island, while the industrial sector is the largest contributor to gross regional domestic product (GDRP). Government policy to develop green technology is mandatory so that there is no trade-off between industry and environmental quality.

Originality/value – This study is able to identify the differentiating variables of environmental quality in two different groups, on Java and on the other islands of the Indonesian archipelago.

Keywords Environmental quality, FDI, HDI, Industry, Population, Discriminant analysis

Paper type Research paper

Introduction

The idea behind sustainable development is a concept that balances economic, social and environmental factors. Development in developing countries, in general, sees an imbalance between high economic growth and development in other fields, especially environmental factors. However, implementation development in Indonesia has not been optimal. Its success is seen in terms of economic indicators being out of balance with other development indicators, especially environmental indicators (Fauzi and Oxtavianus, 2014). The imbalance between

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This work is supported by Faculty of Economics, Universitas Negeri Semarang as the funding of this research.

Management of Environmental Quality: An International Journal
Emerald Publishing Limited
1477-7835
DOI 10.1108/MEQ-02-2022-0034

economic and environmental development in Indonesia is visible in the contrast between the island of Java and the other islands (sometimes referred to as non-Java islands). The imbalance between economic, social and environmental development mainly occurs on Java, which can be seen from the interisland environmental quality index or Indeks Kualitas Lingkungan Hidup (IKLH). According to the IKLH in 2010–2019, Java was the lowest ranked island compared to the other islands in Indonesia, with an average of 52 points, while other islands (Papua, Maluku, Sulawesi, Kalimantan, Bali and Nusa Tenggara, and Sumatra) had an average of 82 points. Based on the IKLH's categorization, a score on the index that is above 80 is considered very good, while $50 < IKLH \leq 60$ is considered not good (*Kementerian Lingkungan Hidup dan Kehutanan*, 2020). According to the IKLH categories, the average environmental index on Java is generally good whereas on the other islands the indexes are not too good.

The difference in environmental quality between Java and other islands is an important phenomenon to be researched in the context of the current plan to move the capital city of Indonesia based on Law No. 3 of 2022 concerning the state capital which relates to the capital city of Indonesia being located on the island of Kalimantan (and no longer on Java) whose predicate, based on the IKLH, is very good. Some researchers have explained that the reasons behind relocating the capital are population density, environmental degradation and urban inconvenience (Rachmawati *et al.*, 2021). Relocation of the capital will have its own consequences for environment in the future. A city that has fewer citizens will grow into a metropolitan area. Conflict between economic growth, social and environment will continue to happen (Buchori *et al.*, 2017, 2020; Buchori and Sugiri, 2016; Chen *et al.*, 2017; Sugiri *et al.*, 2011; United Nations, 2014). The outlook is that, by identifying the aspects that distinguish between environmental quality on Java and on islands other than Java, the results can become the basis for making decisions so that the quality of the environment on the other island (Kalimantan) remains very good despite the capital relocation.

Another reason that distinguishes between the environmental quality in Java and the other islands of Indonesia is the conditions affecting them are very different and unique. The contribution to gross regional domestic product (GDRP) by Java and the other islands and to gross national product (GNP) are distinct. The contribution of the industrial sector to GDRP is very different due to contrasts between the facilities and infrastructure. Java and the other islands are different in terms of population density. The denser the population, the worse the environmental quality (Oktavilia *et al.*, 2019; Pujiati *et al.*, 2018, 2019; Pujiati and Imron, 2020). The increasing population, the need for transportation, land and food cause the quality of the environment to decline (Chowdhury and Hossain, 2018; Malthus, 1798; Musse *et al.*, 2018).

There are some factors that can intervene in terms of environmental quality such as GDRP, energy consumption, population growth, literacy, urbanization rate and foreign direct investment **(**FDI) (Fakher and Abedi, 2017; Fakher, 2019; Hao *et al.*, 2018). FDI has a positive impact on environmental quality in developing countries but does not apply in developed countries. Trade openness can reduce the impact of carbon emissions in developed countries but does not apply in developing countries (Khan *et al.*, 2021). Economic growth, especially in developing countries, is the reason for the decline in environmental quality (Mukhopadhyay and Pani, 2022). The other influencing factor is human development index (HDI). Environmental performance and HDI are positively correlated in both developed and developing countries (Hickel, 2020; Lai and Chen, 2020).

Trade openness benefits the community and the state in terms of foreign exchange, but if there is no trade restriction regulation, it causes the entry of low-quality and high-emission energy consumption goods, thereby increasing carbon emissions (Acheampong *et al.*, 2019; Coskuner *et al.*, 2020; Kwakwa, 2020). There are different points of view regarding trade and environmental quality (Esmaeilpour Moghadam and Dehbashi, 2018; Fakher and Abedi, 2017; Soylu *et al.*, 2021), where trade can be seen as damaging the environment or as having the effect of improving environmental quality (Chen and Hu, 2020; Xie and Wu, 2021).

The industrial sector's contribution, which dominates the GDRP, on the one hand increases economic development and on the other hand decreases environmental quality. Most of it is generated from the industrial sector's contribution, which harms environmental quality such as water pollution, air pollution, land pollution and land conversion. The industry plays a vital role in environmental and ecosystem damage in an area (Shahabadi *et al.*, 2017). Industry's role in the era of globalization, with increasingly open international trade, cannot be avoided. Vural (2021) states that economic development can increase innovation and produce new inventions to build more environmentally friendly resources. The theory that explains the relationship between the industry and the environment can be explained through the environmental Kuznets curve (EKC) theory.

Lau *et al.* (2018) studied 100 developed and developing countries to examine the EKC hypothesis based on the quality of institutions, resulting in the conclusion that there is an inverse U-relationship with economic growth and carbon dioxide emissions in developed countries which is not found in developing countries. Sarkodie and Strezov (2018) found that the driving factor for carbon emissions in developed and developing countries is the economy based on agriculture, transportation, services, paradigm shifting and structure in industries in Australia, China, Ghana and the USA in 1971–2013.

The population also influences the quality of the environment. The more the population increases, the more needs there are that must be met, including housing, transportation, goods and services (Pujiati *et al.*, 2022a,b). According to Todaro and Smith (2020), population spikes have resulted in environmental degradation or the erosion of minimal natural resources. Exploitation activities that are not guided by environmental management can reduce the availability of limited resources. Population density, energy and mining activity and fossil exploration can increase CO_2 production (Heidari *et al.*, 2015; Jebli *et al.*, 2017; Wang *et al.*, 2018; Yahaya and Hussaini, 2020). The increase in population will increase the demand for land clearing for housing (Ohlan, 2015; Rahman, 2017).

The quality of the population can be seen from the human development index. The ability of human resources to engage in the production process will determine the results, which will later become the endowment factor of a country's comparative advantage. The higher the HDI value in an area, the better the quality of human resources there. Increased knowledge and duration of education, income per capita and health are essential factors in preserving the environment (Shahabadi *et al.*, 2017). Increasing human capabilities can be used as capital in processing resources to be more efficient and produce outputs that are more environmentally friendly.

There are still differences between the research results related to factors that affect environmental quality, the openness factor, FDI, the industry, population and HDI which are currently unavoidable by countries globally; it is crucial to research factors that affect environmental quality. The difference between this and previous research is that previous research tends to focus on HDI as the indicator variable. Previous research has examined the HDI indicators separately such as levels of education, health and literacy. Indicators of impact on the environment, such as education (Garnawat *et al.*, 2017; Imamoglu, 2018; Mujan *et al.*, 2019; Vilcekova *et al.*, 2017), health (Alola and Kirikkaleli, 2019; Zomorrodi and Zhou, 2017) as well as literacy rates (Musse *et al.*, 2018) on environmental quality. Arisman (2018) found that HDI reflects the quality of HR by showing the fixed effect model on population and GDP per capita affects HDI rankings in Association of Southeast Asian Nations (ASEAN) countries.

The novelty that the researcher is seeking to present is regarding the views that exist on the island of Java and on the other islands are attached to variables that can affect the ability of the region to be more responsive to the environment related to them using secondary data with coverage throughout Indonesia. The discriminant analysis tool has two categories; the first is the dependent variable, namely, the quality of the environment on Java and on other islands, which can provide a more detailed and helpful discussion for policymaking. Discriminant analysis is used to identify two different groups (Stella, 2019), for example,

based on the category of loyal and non-loyal consumers (Isliko, 2016), and based on economic status (strong or weak) (Egbo and Bartholomew, 2017). This research aims to identify what factors differentiate between the levels of environmental quality of provinces on the island of Java and on the other islands.

Literature review

Impact of trade openness on environmental quality

Trade openness has a connection and will influence FDI (Burange *et al.*, 2019; Djulius, 2017; Makoni, 2018; Rakshit, 2022; Rathnayaka Mudiyanselage *et al.*, 2021). Kumari *et al.* (2021) found that there was a long term causal connection between FDI, trade openness and economic growth in India and FDI and trade openness influenced both ways.

Trade openness and FDI in a country where investment circulates will influence the whole ecosystem (Le *et al.*, 2016; Oktavilia and Firmansyah, 2016; Tran and Do, 2021). This idea leads to the hypotheses of the pollution halo and pollution haven through the EKC. According to Tran and Do (2021), trade openness and FDI caused environmental degradation in Malaysia and Indonesia in the long term but not in Thailand. Le *et al.* (2016) found that trade openness impacted positively in high-income countries, but had a negative impact in low and middle income countries. Ali *et al.* (2020) found that by using trade openness, FDI and institution performance as variables influencing the environment found that there was a positive relationship between trade openness and urbanization in terms of the ecological footprint but found no relationship with institution performance.

Impact of FDI on environmental quality

Simon Kuznets, using his EKC, stated that economic activity will destroy the environment but when the income increases, the demand for environmental treatment will rise with the availability of sources of investment (Isiksal, 2021; Isiksal *et al.*, 2019). The validity of EKC was demonstrated in Indonesia and China (Sarkodie and Strezov, 2019).

In another theory, investment-based economic growth is tested with two hypotheses, namely, the pollution haven hypothesis and the pollution halo hypothesis (Adeel-Farooq *et al.*, 2021). The two hypotheses are still closely related to the EKC: the pollution haven hypothesis states that tighter environmental policies at home and looser ones abroad cause developed countries to move industries that harm the environment to more developed countries, causing developing countries to become "pollution havens" for pollution-intensive industries (Bulus and Koc, 2021; Guzel and Okumus, 2020; Sarkodie and Strezov, 2019; Singhania and Saini, 2021; Ur Rahman *et al.*, 2019). On the other hand, developed countries transfer technological progress, environment-based FDI and better environmental standards to developing countries which are incorporated into the pollution halo hypothesis, so that FDI from developed countries can improve environmental quality in developing countries (Balsalobre-Lorente *et al.*, 2019; Mert and Caglar, 2020; Oktavilia *et al.*, 2019; Pujiati *et al.*, 2020b).

The impact of industry on environmental quality

According to Febriana *et al.* (2019), the production process in the industrial sector produces liquid and solid waste that can pollute the environment. This is endorsed by Shahabadi *et al.* (2017) who explain that industrial activities will increase the use of vehicles that produce emissions in the air, and the disposal of waste that can harm ecosystems in an area. The study was supported by Cui *et al.* (2020) who state that industrial growth causes environmental damage. However, according to Fibrianto (2018), an increase in activity in the industrial sector will increase a country's GDP revenue, and this will affect the increase in financing for environmental management.

The impact of population on environmental quality

According to Han *et al.* (2018) and Pujiati *et al.* (2020a, b), human population plays an important role in increasing Particulate Matter (PM) 2.5 pollution. In his research, Ghanem (2018) found that an increase of 1% of the population led to a 2.4% increase in pollution and an increase in pollution caused a decrease in health which led to a decrease in labor productivity. Population has other impacts besides the environment including poverty and economic growth. Nabi *et al.* (2020) found that there is a positive relationship between poverty levels and carbon emissions in 98 developed and developing countries.

The impact of HDI on environmental quality

Using the HDI is one way to view the quality of human life in a country based on life expectancy, education and health. Several studies have shown that life expectancy, education and health are influenced by the quality of the environment (Ghanem, 2018; Han *et al.*, 2018; Hossain and Chen, 2021; Joof and Isiksal, 2021; Nabi *et al.*, 2020). According to Ladi *et al.* (2021), water quality can have an effect on HDI. Li and Xu (2021) studied the environmental damage index (EDI) and HDI in provinces in China found that environmental damage causes a delay in economic growth and every 0.01% increase in environmental damage reduces GDP by 3.15%.

Methods

Type and source of data

This study uses a quantitative research approach. The data used are secondary data sourced from the Central Statistics Agency and the Ministry of Environment and Forestry. The analytical method is discriminant analysis which is used to build predictive models for each group. In this research, two groups are studied: a group of provinces located on the island of Java and a group of provinces on other islands (outside Java). Discriminant analysis requires a combination of linear derivatives between two or more variables that will discriminate against each other through the groups that have been developed (Keskin *et al.*, 2020). A simple linear discriminant function converts the sample size to the discriminant value (Ismail *et al.*, 2016).

Variables and operational definitions

The variables used are the environmental quality index (IKLH), trade openness (TO), foreign investment (FDI), industrial output (IND), population growth (POP), and Human Development Index (HDI) in 33 provinces in Indonesia. IKLH is measured using three components comprising indexes for water quality, air quality and land cover with units expressed as a percentage. Trade openness (TO) is measured by adding the number of exports and imports divided by GDRP as a percentage. FDI is measured by direct investment by foreign parties in units of US$ millions. IND is measured by the total contribution of the industrial sector to GDRP in billions of rupiah. POP is measured by calculating the change in population compared to the previous year in percentage. HDI is measured from education, health and a decent standard of living in an index expressed as units.

Model and analysis steps

The equation for the estimation of the discriminant function in the two groups in this study uses the discriminant model (Hair, 1998; Vazquez-Brust and Plaza-úbeda, 2021; Wang *et al.*, 2013):

$$Zjk = a + W_1X_{1k} + W_2X_{2k} + \ldots + W_nX_{nk} \quad (1)$$

noted as follows:

Zjk = discriminant Z score of discriminant function j for Object k,

A = intercept,

W*i* = discriminant weight for the independent variable *i and*

X*i*k = the independent variable *i* for the object

or the discriminant function equation can be calculated from the standardized value as follows:

$$Dj = DI1Z1 + DIZz2 + \ldots.. + dipzp \quad (2)$$

An individual's standardized score on the *i*th discriminant function (D*i*) is found by multiplying the standardized score on each predictor (z) by its standardized discriminant function coefficient (d*i*) and then adding the products for all predictors (Stella, 2019).

To test whether there is a significant difference between the two groups in Java and non-Java, it can be done using Wilk's lambda test statistic and can be converted into an F ratio. If the significance of the F ratio < 0.05 then the discriminant variable can be used to form the discriminant model and vice versa. The reason for using Wilk's lambda as a test in discriminant analysis is because the method used is robust (Alrawashdeh and Radwan, 2017).

To test the differences between the two groups of environmental quality in Java and outside Java for all variables, the chi square was used together. If the chi-square significance value is < 0.05, then the discriminant functions for the two groups are significantly different and vice versa. The next step is to test how big and meaningful the difference between the two groups can be seen from the value of the square canonical correlation (CR^2). CR^2 is identical to R^2 in the regression that measures the variation between the two groups of environmental quality in Java and non-Java which can be explained by discriminant variables.

Result and discussion

This section will identify factors that determine the different quality of the environment in provinces of Java and on other islands. There are several stages of analysis, the first being descriptive statistics. According to descriptive statistics, the average trade openness, foreign investment, industrial sector output, population growth and human development index in provinces of Java (Code 1) are higher than those in provinces outside Java (Code 0). These even exceed the average in Indonesia (Table 1). Foreign investment and the output of the industrial sector in the provinces of Java are very different. Foreign investment in Java Island averaged US$ 2,517 million, whereas provinces outside Java averaged US$ 451 million, and provinces in Indonesia averaged US$ 826 million. This shows that better infrastructure and facilities in the provinces of Java are more attractive for foreign investors. The average foreign investment is in line with the average contribution of industrial output to GDRP.

Second, the test of equality of group means all variables FDI, IND, POP and HDI are significant other than the trade openness variable. This test shows that in addition to trade openness, it can be used to form the discriminant variable because the significance value is > 0.05 or 0.493 (Table 2). Wilk's lambda test was used. Based on the CR value of 0.796 or CR^2 of 0.633, it can be concluded that 63.3% of the variation between the groups of provinces in Java and outside Java can be explained by the discriminant variables of trade openness, foreign investment, industrial sector output, population growth and human development index.

Third, compiling the discriminant function estimation equation the equations can be arranged based on the output canonical discriminant function coefficient (Table 3). The discriminant function equations are as follows:

Island		Mean
0	TRADE	50.1516
	FDI	451.0960
	IND	22,507.5365
	POP	2.0526
	HDI	67.1203
1	TRADE	55.1307
	FDI	2,517.0024
	IND	243,102.3479
	POP	1.4357
	HDI	71.8652
Total	TRADE	51.0569
	FDI	826.7154
	IND	62,615.6840
	POP	1.9404
	HDI	67.9830

Table 1.
Average trade, FDI, the industry, population growth and the human development index on Java (1) and outside Java (0)

	Wilks' lambda	F	df1	df2	Sig.
TRADE	0.998	0.472	1	229	0.493
FDI	0.591	158.752	1	229	0.000
IND	0.437	295.499	1	229	0.000
POP	0.978	5.263	1	229	0.023
HDI	0.823	49.197	1	229	0.000

Table 2.
Tests of equality of group means

$Z = -8.586 + 2.22E\text{-}04\ FDI + 1.00E\text{-}05\ IND - 0.114\ POP + 0.118\ HDI$ or can be written in the form of an equation where the coefficients have been standardized based on the calculation of Equation (2) (as follows):

$$D = 1.35E\text{-}03\ FDI + 6.09E\text{-}05IND - 0.695POP + 0.719HDI$$

The variable of international trade openness is not a differentiating variable for the quality of the environment on Java and outside Java; therefore, it is no longer included in the discriminant equation.

Based on Wilk's lamda value (Table 4) of 0.367 or the same as the chi square of 227.329 with a significance at 0, the average discriminant score in the two groups of provinces of Java is the average discriminant score, and outside Java is significantly different. Although statistically, the difference between the two groups of provinces of Java and outside Java is significant, the difference is not significantly large. The next step is to test how big and meaningful the difference between provinces of Java and outside Java can be seen from the Square Canonical Correlation (CR^2).

Based on the CR value of 0.796 (see Table 5) or CR^2 of 0.633, this value correlates with Wilk's lambda where it was obtained by (1-0.633 = 0.367) in Table 4, it can be concluded that 63.3% of the variation between the groups of provinces of Java and outside Java can be explained by the discriminant variables of trade openness, foreign investment, industrial sector output, population growth and development index human.

Fourth, examining the contribution of each variable to form the discriminant function the contribution of each variable in the discriminant function can be seen from standardized canonical discriminant function (Table 6). Standardized coefficients are used to assess the relative importance of discriminator variables in forming discriminant functions. The higher

the standardized coefficient, the more important the variable is to other variables and vice versa. According to Table 6, industrial output has the most significant contribution as a variable that differentiates environmental quality in the provinces of Java and those outside Java at a value of 0.788 followed by a human development index of 0.468, FDI of 0.213, population growth of 0.179 and trade openness of 0.042.

The structure matrix table (Table 7) is another way of indicating the relative importance of the predictors. The loading value of the discriminator variable is the correlation between the discriminant score and the discriminator variable, and the loading value is between +1 and −1. The closer to 1 the absolute value of loading is, the higher the commonality between the discriminant variable and the discriminant function and vice versa. Generally, a factor

Table 3. Canonical discriminant function coefficients unstandardized

Variable	Function
TRADE	−0.001
FDI	2.22E-04
IND	1.00E-05
POP	−0.114
HDI	0.118
Constant	−8.587

Table 4. Wilks' lambda

Test of Function(s)	Wilks' lambda	Chi-square	df	Sig.
1	0.367	227.329	5	0.000

Table 5. Eigenvalues

Function	Eigenvalue	% of variance	Cumulative %	Canonical correlation
1	1.728[a]	100.0	100.0	0.796

Note(s): [a]first 1 canonical discriminant functions were used in the analysis

Table 6. Standardized canonical discriminant function coefficients

Variable	Function
TRADE	−0.042
FDI	0.213
IND	0.788
POP	−0.179
HDI	0.468

Table 7. Structure matrix

	Function 1
TRADE	0.035
FDI	0.633
IND	0.864
POP	−0.115
HDI	0.353

loading of 0.3 is seen as the cut-off between important and less important variables. According to Table 7, industrial output has the most significant contribution as a variable that differentiates environmental quality in the provinces of Java and those outside Java at a value of 0.864 followed by a foreign investment of 0.633, human development index of 0.353, population growth of 0.115 and trade openness of 0.035.

The contributions that differentiate environmental quality on Java and the other islands are industrial output, FDI, HDI and population growth. The variable that does not make a difference is the trade openness of each research area. The variable FDI and industrial output differ between Java and the other islands because the foreign investment that enters Indonesia regarding mining and natural products is diverted to outside Java, while the industrial and manufacturing sector investment tends to enter Java. This finding is consistent with research by, Chandran and Tang (2013) and Zhang *et al.* (2020). In addition, the distribution range of industrial output in Java is much easier due to the relatively more complete infrastructure than what exists outside Java. This is a significant differentiator considering that the order of the highest differentiators is industrial output and FDI.

According to the Investment Coordinating Board, from 2014 to 2015, FDI in Indonesia increased by 20% (Sjöholm, 2016). Several factors driving the increase in FDI in Indonesia were energy consumption, trade openness and the rupiah exchange rate (Djulius, 2017). The convenience is obtained when the regional government and the central government are open economically and to investment, namely, the emergence of new job opportunities that can absorb labor, increased human resource capabilities and broader market access because investment openness opens new markets in the surrounding area.

Furthermore, the HDI variable causes differences in environmental quality between Java and the other islands. The HDI factors are in the aspects of health, education and literacy. Several studies show that the more evenly distributed the facilities and infrastructure for education, health and equitable access to public facilities are in an area, the better the HDI score; furthermore, adequate infrastructure that accommodates the community can rectify damage to the quality of the environment in the area (Dipeolu and Ibem, 2020; Hewitt *et al.*, 2019; Mamirkulova *et al.*, 2020; Shen *et al.*, 2020; Tomson *et al.*, 2021).

In BPS data, the local literacy rate in Java Island was above 90 in 2020, with the lowest rate found in East Java Province at 92.5 and the other islands having an average score above 92 except for Papua and West Nusa Tenggara Provinces (*Badan Pusat Statistik*, 2021). However, policymakers should note that infrastructure that does not pay attention to the AMDAL assessment will result in environmental damage. This means that not all excessive infrastructure will have a positive impact on society and the environment, such as initiating road infrastructure, which reduces land and forests as environmental ecosystems of flora and fauna (Bebbington *et al.*, 2018; Erbaugh *et al.*, 2020; Sloan *et al.*, 2018).

Unequal access and availability of facilities will exacerbate poverty, inequality and reduce government revenues. The population growth variable is the last differentiating factor between Java and outside Java. This is because the growth and population density on Java is much faster than that on other islands. The increasing population growth will have an impact on the carbon footprint and the amount of CO_2. Natural resources, energy consumption and population are several factors that can affect environmental quality (Aslan *et al.*, 2018; Bildirici, 2017; Destek *et al.*, 2018).

According to Muryani and Pamungkas (2018), unemployment is a factor that affects national development and the level of social welfare. Unemployment has a relationship with the low capacity of human resources. This is also mentioned by Fahrika *et al.* (2020) who state that the causes of the low quality of human resources include the poor conditions and quality of education. In a comparison between Java and other islands, there will be inequality that occurs, and it does not mean that this inequality cannot be anticipated with the indigenous values and culture of the community to continue to preserve the surrounding environment.

An example of this happening was when the indigenous local values of the tribes outside Java (Tobelo and Sariga) and on the island of Java (Baduy) still uphold the values of environmental conservation (Arifin *et al.*, 2021; Asteria *et al.*, 2021; Saidiman *et al.*, 2020).

The population is the weakest factor in influencing differences in environmental quality on Java and outside Java. It is the lowest on a numerical scale and has a negative symbol, which means that it does not have a differentiating impact on the environment on Java and outside Java. Meanwhile, if you look at previous research, an increasing population in one area will also worsen the quality of the environment in that area (Adams and Acheampong, 2019; Ohlan, 2015; Rahman, 2017; Rahman *et al.*, 2017). The quality of the environment is determined by carbon emissions, and one way to look at the factors driving the production of carbon emissions is population growth which includes urbanization, the age structure of the community and the rate of population growth (Abdelfattah *et al.*, 2018; Chekouri *et al.*, 2020; Dimnwobi *et al.*, 2021; Li *et al.*, 2019; Wang *et al.*, 2013). With this anomaly in the results, it is necessary to examine it through future research on population growth and urbanization and their relationship with the quality of life.

Conclusion

This research examines the factors that differentiate between Java and the other islands in terms of environmental quality in 33 provinces in Indonesia during the 2011–2017 period. This test is done by determining the variables that affect the environmental quality index – trade openness, industrial output, FDI, HDI and population growth. The decisions about variable selection are based on the environmental quality index issued by the Indonesian Ministry of Environment and Forestry and from previous research. This research indicates that trade openness implemented in Java and on other islands does not make a difference in environmental quality in the two research areas. Other variables are factors that differentiate the environmental quality between Java and other islands.

Practical implications

Although the difference between Java and the other islands can be reduced, it will take quite a long time to make changes on a massive scale, especially in the variables of industrial output, FDI, HDI and population growth. There is a need for schemes and planning to determine environmentally friendly economic strategies to create equality between regions. Industry is the strongest variable that distinguishes between the environmental quality on Java and the other islands while GDRP is the largest contributor. Government policy needs to develop the industry so that it uses green technology innovation in order not to make trade-off between the industry and environmental quality (Vural, 2021 dan Kalayci, 2021) (Beşe and Kalayci, 2021; Vural, 2021).

Limitations and future research agenda

This study only identified the differentiators of environmental quality based on two categories for Java and the other islands of Indonesia. Subsequent research could examine more than two categories, especially the environmental quality categorization based very good, good, moderately good, poor and dangerous by using multiple discriminant analysis (MDA).

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