

LITERATURE REVIEW OF METHANE QUANTIFICATION FROM ORGANIC WASTE

by

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I. Introduction

Efforts of mitigating greenhouse gas (GHG) in Indonesia need to be accelerated to balance and anticipate recent development in various sectors which potentially produce GHG. Besides land-use change, forestry, and energy sectors as the major GHG producers, GHG coming from waste may get more attentions. Organic wastes which have yet to get considerable solution may need to integrate with methane capture. Methane capture from organic wastes, therefore, will get two benefits i.e., solution of organic management and production of renewable energy.

II. Objective

The objective of the project is to conduct a comprehensive literature review of methane quantification from organic waste, with a particular focus on the findings and practices that have been implemented in other countries, and how they could be applied in the context of Indonesia. The review aims to provide insights into the current global practices and findings in methane quantification from organic waste and to identify best practices and methods that can be applied to the Indonesian context.

The scope of work for the consultant that will provide the service of conducting the literature review on methane quantification from organic waste would include:

1. Conducting a comprehensive literature search of relevant databases, including scientific journals, reports, and other relevant sources, to identify studies and reports related to methane quantification from organic waste.
2. Developing a methodology for reviewing and analyzing the literature, including a framework for categorizing and synthesizing the information gathered.
3. Assessment of the extent of which the international experience and data may apply in the Indonesian context, based on differences in e.g., production potential in relation to external aspects (environment, organic waste quality/quantity) and internal aspects (production process, technology).
4. Assessment of the potential benefits and challenges associated with biogas production from organic waste, with a focus on the Indonesian context.
5. Identifying knowledge gaps and research needs related to methane quantification from organic waste in the Indonesian context.
6. To identify the characteristics of MSW in Indonesia
7. Develop recommendations for methane production from organic waste in Indonesia based on the above studies and assessments.
8. Delivering a comprehensive report and a Power Point presentation summarizing the findings of the literature review, including an executive summary, methodology, analysis, recommendations, and references.

III. Methodology

Literature review of the study will employ bibliometric software to search databases related to methane quantification from organic wastes. The software has the capability of searching databases comprehensively and accurately, although it identifies only from the presence of the key words in the articles. To get thorough ideas of the articles, content review is required, therefore, there is need to make a kind of search iteration. Discarding some items may apply to get specific topic.

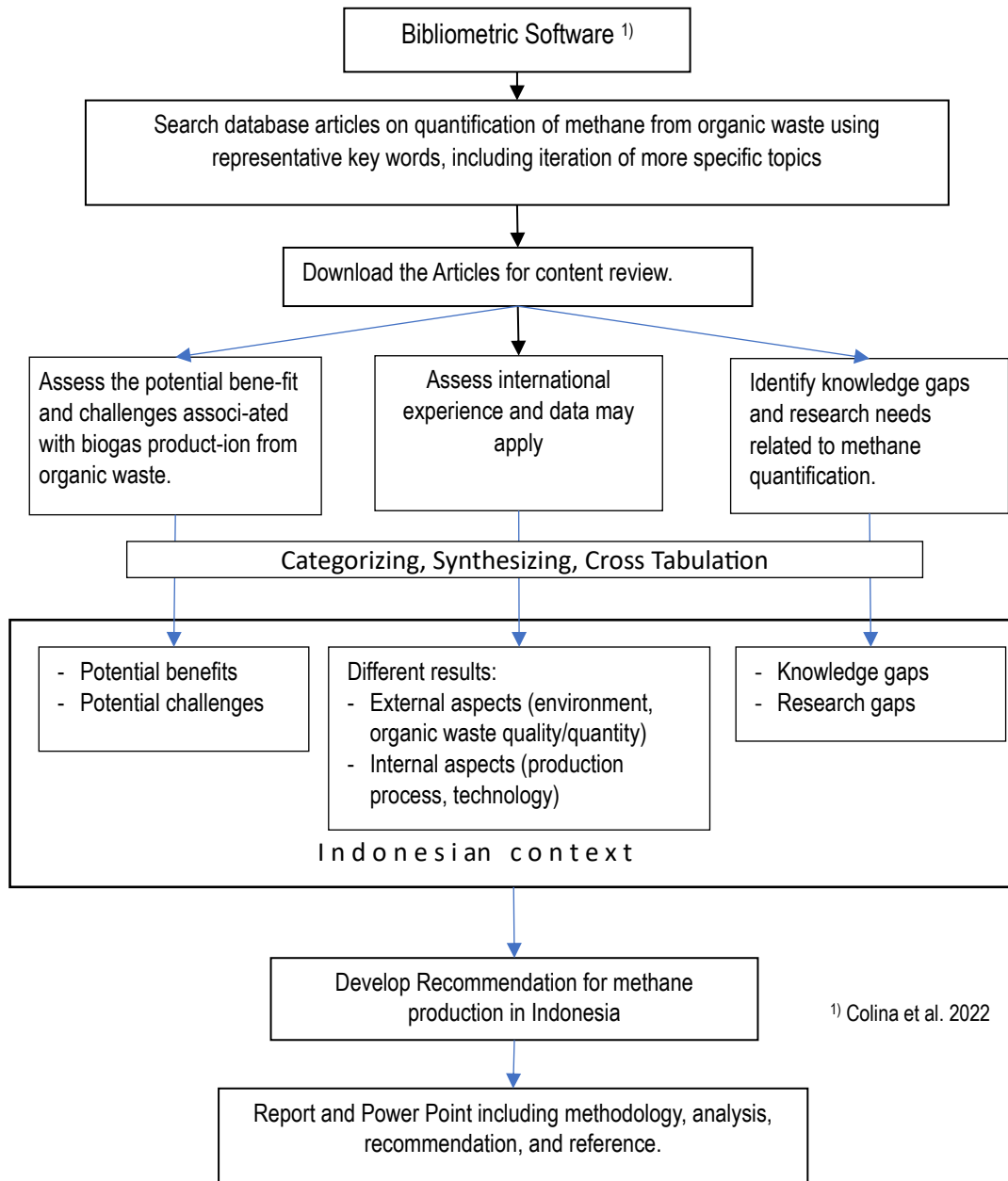


Figure 1. A diagram showing the methodology and steps of the study.

IV. Results and Discussion

International experience of biogas/biomethane quantification shows there are some factors affecting the yield of biogas/biomethane. The factors consist of temperature, pH, carbon-nitrogen ratio, moisture content, organic loading rate, hydraulic retention time and solid retention time, and type of digester.

There are several benefits associated with biogas/biomethane production, namely reducing waste, reducing methane emissions, and increasing income. Meanwhile, the potential challenges comprise resources of feedstock, market, regulation, and financing.

Knowledge gaps are directed to biogas/biomethane development using four the main wastes, namely POME, manure, municipal solid waste, and liquid tapioca. Among the main wastes, only MSW which has not been resolved through digestion, from which the biogas/biomethane and the digestate can be utilized.

Information of the characteristics of Municipal Organic Waste (MSW) is crucial to ensure the content of biogas/biomethane in anaerobic digestion. MSW coming from different sources has different characteristics. Most waste in landfills is various organic material because the waste in landfill has been reduced by scavengers. They utilize all things which are still valuable, particularly plastic, wood, carton, which makes the percentage of organic waste increase.

For that reason, the research needed to be carried out is related to the use of MSW as the feedstock in biogas plants, particularly fruit and vegetable wastes. The waste should be conducive as it is similar with the waste of agroindustry in which the waste has been accumulated at the market, thus the transportation cost can be saved.

There are several initial studies that can be prepared prior to establishing the biogas/biomethane from fruit and vegetable wastes in the market. The studies may include identification of markets which have potential for establishing biogas/biomethane plants, the characteristics and the chemical content of waste, and the potential off taker of the production of the biogas/biomethane.