

# Water accounting implementation: water footprint and water efficiency of the coffee shop in Indonesia

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**Abstract.** The purpose of this paper is for understand the water accounting practice in the company, especially beverage industry in Indonesia. The sample in this study is one coffee shop near Jakarta. Case study has been choosen as the method in this study. We collect data with semi-structured interview, observation, and survey about the water efficiency in the coffee shop. The operational officers such as barista, cashier, supervisor, and store manager are the respondents in this study. Operational management already understand about the importance of water efficiency in the coffee shop operation, but it can't be implemented because their standard operation haven't use the water efficiency as part of their procedures. The coffee shop's operational standard in cleaning always takes much time and use so much water. The cleaning itself takes one until two hours each day only for cleaning bar and all operational equipment. This paper is for understand the water efficiency in the coffee shop with the focus is in their water footprint, operational standard that used every day in the coffee shop, and the connection between operational standard and the water efficiency.

**Keywords:** coffee shop, water accounting, water footprint, water efficiency

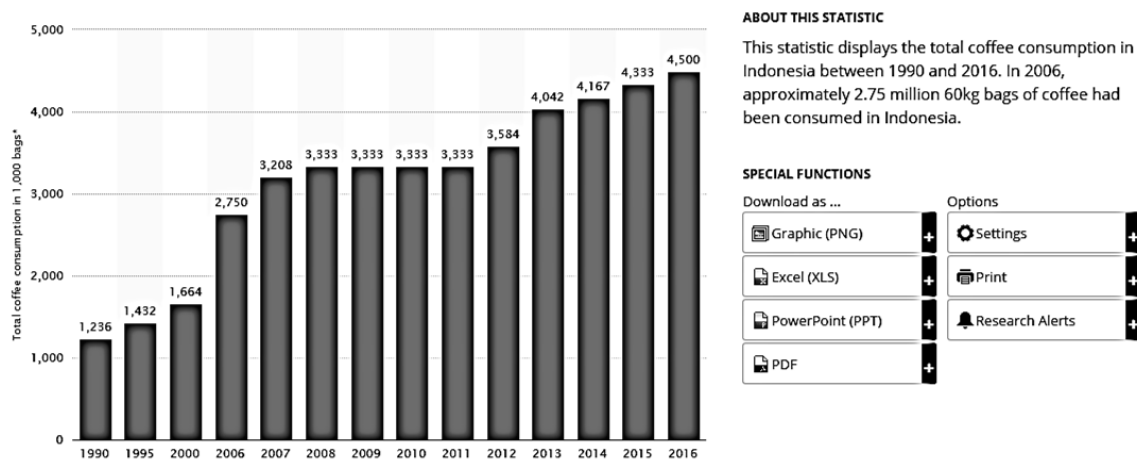
## 1. Introduction

Water, the element in humans' life that can't be separated in their daily life as an important aspect. Not only human who consume water in their life, but also the companies generally also consume water as part of their production. The companies always consume the natural resources, but there are still many of them don't pay attention about what happenned in our planet, a climate change. Actually, water is a part of natural resources that can be limited and scarcity when the extreme weather in the place that need water and using biomass as new product. Development of biomass products as one of renewable energy products is in countries in Africa, Europe, Southeast Asia, and Australia [1]. Therefore, Indonesia as one of the various countries in the part of Southeast Asia, should have started to focus on the scarcity of water occurring in Indonesia, especially urban areas and industries that use water as their production.

Industries that use water are not just large industries like manufacturing industry, but also food and beverage industries, for example in coffee shops. The availability of clean water is also a concern for coffee shop entrepreneurs and baristas as well as the coffee industry itself because water itself is the core in every coffee creations that can affect the quality of coffee, both from coffee beans until the coffee is served [5]. Water contributes to the presentation of coffee, not just for brewing, but also for other activities. Water can be used for hand washing, mopping floors, cleaning pitchers, ice machines, dipper wells, and for rest room [4]. This means that enough water is used by the cafe or coffee shop inside serving one cup of coffee due to the large amount of water used for supporting activities.



Indonesian coffee consumption continues to grow, growing faster than existing production at the moment [12]. Researchers [12] explained that the industry is reporting coffee growth is currently being led by the consumption of coffee dissolves. The retail coffee shop also continues to grow, growing in the business of shopping centers such as malls and transportation hubs such as the Starbucks coffee shop on Sudirman station. Judging from the phenomenon and statistical data, the development of people's interest in coffee continues to grow and allows it to become a market that is enough targeted by entrepreneurs. The phenomenon that occurs in Indonesia about the consumption of coffee that continues to increase from year to year, is depicted in the Figure 1.



**Figure 1.** Growth data on coffee consumption in Indonesia.

Stakeholder theory further explains how managers or stakeholders should act and should look at organizational goals, based on some ethical principles. This theory suggests that managers treat stakeholders according to stakeholder concepts that will be more successful organizations in the long term [6]. In this study, the management sees the interests of the coffee shop in the long term regarding environmental conservation. With the influence directly or indirectly, coffee shops are expected to be more environmentally conserving in accordance with the desired by the other party.

Water footprint is a geographically explicit indicator, not only showing the volume of water use and pollution, but also the location [2]. Compared to other water accounting tools, the water footprint provides the most extensive data and complete water counting methods, as it includes both direct and indirect use of water and considers water consumption and pollution. Water footprint is the volume of freshwater used to produce the product, measured through various stages of the production chain. The use of water is measured in terms of the volume of water consumed or polluted. Water consumption refers to the water used or produced into the manufacture of the product [7].

Further water footprint concepts are specified for specific processes or products, and for every well-defined consumer group (eg individual, family, village, city, province, state, state) or producer (eg public organization, private company, economy sector). From the perspective of producers and consumers, WF is an indicator of both direct and indirect use of WF water is geographic and temporal indicators [3]. WF not only shows the volume of water use and pollution, but also the location of the presence of water.

Efficiency can be defined generally, the ratio between the desired output and the input, ie the quantity of resources consumed in the process of increasing efficiency means creating more value with less resource consumption [1]. Water efficiency is a multi-faceted concept. This means doing more and better with less by getting more value with available resources, by reducing resource consumption and reducing pollution and the environmental impact of water use for the production of goods and services at each stage of the value chain. Improving water efficiency means increasing water productivity, reducing the intensity of water use and pollution from socio-economic activities by maximizing the value of water use, improving water allocation among competing water uses so as to obtain socio-

economic value that saves water flow, and improves technical efficiency Water services and management of their provision over the complete life cycle [11].

This study discusses the water footprint and water efficiency of water use in the coffee shop. Water footprint is an indicator of water use that is seen both directly and indirectly from consumers or producers [2]. Water footprint for an individual, a community or a business is defined as the total volume of freshwater used to produce goods and services consumed by an individual or society or produced by a business [7]. If the water is produced by the business, then the need for efficient use of clean water, considering the water is one of the natural resources that are already quite rare nowadays. The purpose of measuring the efficiency of water use is to be able to complete the desired task by using the minimum amount of water without harming the existing system [10]. This study will try to find out how the implementation of water footprint and water efficiency in a coffee shop near the capital Jakarta is in Tangerang City because Tangerang is a city buffer city of Jakarta and many shopping centers and other public places in Tangerang as a place selected by coffee shops for selling their products. With the large or increasing number of coffee shops opened, the consumption of water used in coffee shops is also more and more. This is because every coffee shop uses water to produce or perform support activities such as washing equipment, mopping, and other things related to the coffee shop business.

## **2. Research Method**

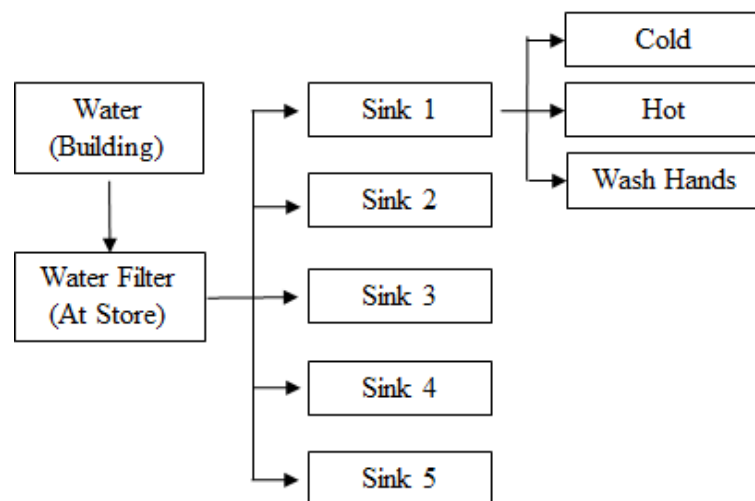
The method used in this research is using case study method. The sample in this research is a coffee shop located in Tangerang, Indonesia. It needs to be observed and field survey in advance about the use of water path or water footprint in the coffee shop and allotment of existing water flow. In addition to the observation and field survey of water footprint, the water efficiency in the coffee shop can be known by conducting interviews or interviews to employees of the coffee shop. The interview was done to the store manager, supervisor, and barista of the coffee shop. From the results of observations, surveys, and interviews conducted, it will be analyzed on the efficiency of water that has been done by the coffee shop based on water footprint and information on awareness of water efficiency.

The first step in the study is to conduct semi-structured interviews or interviews based on the interview list [8], [9] along with observations and surveys of the coffee shop. Interviews were conducted with store managers, supervisors, baristas, and cashiers who were part of the organizational structure of the coffee shop concerned with awareness of the importance of water and water efficiency of employees.

## **3. Results and Discussion**

The problem of water efficiency in a coffee shop lies in the efficiency in consuming water. SOPs in the coffee shop that are related to water usage is one of them by washing all the existing equipment on the bar (where the drink in the coffee shop) and also the supporting equipment. The support equipment in the bar is not just for making drinks, but also as a storage place, presentation of raw materials, base to put glass, and also equipment to present other complementary materials such as green tea powder, caramel sauce, and others.

Preparation of water footprint was first performed to determine the flow of water used by the coffee shop for production activities, buying and selling, and also supporters (see Figure 2). This production activity means making drinks and serving pastry or food. The buying and selling activities are of course done on the cashier side and also the presentation of the finished drinks on the right side of the bar (where the drinks are taken). Support activities that exist within the coffee shop is to include cleaning the table, floor, windows, and more to the maintenance store.



**Figure 2.** Water footprint in the coffee shop.

Based on the results of the interview, the workers in the coffee shop, ranging from the line store manager to the barista and cashier convey that espresso machine used by the coffee shop using a special tablet washing machine espresso that stay put into the machine and processed by turning the engine in time Every two days, so do not use water directly washed. The machine does not use much water in its washing and is only wiped by a warm cloth for its outer side.

The machine we use is the latest espresso coffee machine with the standard that the coffee shop has prepared. Cleaning it by removing all the coffee beans from the espresso machine, the outside of the machine to muddy the coffee beans divakum, then every two days using a special machine washing tablet to clean the inside of the machine.

All sinks in the coffee shop use filtered water and can be consumed for drinking. All water sinks use cold and hot water for each tap in the sink. Water Sink in the coffee shop there are at least two types of water temperature ie hot and cold temperatures. Hot water temperatures help the baristas to clean the equipment in the bar, such as pitchers, plates, spoon wash, and also to wash the blender. All employees in the coffee shop implement SOP cleaning of production equipment with the standard coffee shop. Average washing after closing the shop for bar equipment, pastry, and also cleaning the shop area, takes 1-2 hours.

Not just baristas and store managers who feel responsible for the coffee shop, but also other parts, such as cashier and pastry section. Although the section is less related to water use than the rest of the coffee shop, the pastry section also knows that efficiency is important in its role in the coffee shop. As in the interview results, one employee, the cashier who also doubles as a pastry section knows the importance of water use that is related to the efficiency of water consumption and affects the cost efficiency of the coffee shop.

For interview results at the supervisor level, supervisors are aware that the water consumed by the coffee shop is quite a lot per day, as it requires laundering many of the equipment in the coffee shop. For example, on the matt or base for to make a drink that is on the bar by washing it every day. This is because the number of droplets of raw materials at the time of making drinks ordered by customers, especially syrup or sugar. With that, it needs constant washing and the supervisor realizes that it is faster to wash with hot water than regular water. At the supervisor level it is more to the awareness that there is a lot of water consumption, but realize that efficiency can not be done with the will of within the operational lines and management of one store of the coffee shop. This is because the coffee shop is very strict in providing standards or SOPs on every operational undertaken, including on cleanliness.

From the results of interviews and observations made, it can be seen that the coffee shop is actually trying to do the water efficiency by reducing the use of water to wash equipment that is not smudged or dirty. However, back again with a running coffee shop SOP, would be a boomerang if the operational

line management does water efficiency outside of the existing SOP inside the coffee shop. Therefore, representing all employees, the cashier section has disclosed that coffee shops should change SOP related to water efficiency or in other words is to incorporate water efficiency variables into company SOP.

As mentioned earlier on the definition of water footprint, water footprint is the volume of freshwater used to produce the product, measured through various stages of the production chain. Water efficiency is a multi-faceted concept of doing more and better with less by getting more value, by reducing resource consumption and reducing pollution and the environmental impact of water use for the production of goods and services at each stage of the value chain. These two sections relate to the value chain in which there is a production chain used to produce products and interact with each other. Therefore, it is important in a company to know the water footprint in its business and how to reduce the use of excess water in order to reduce pollution and the poor environment of the production.

Limitations in this study are the first, the lack of data on water use and the cost of using water to be obtained at middle level management. Secondly, additional research is needed by asking for opinions on middle-level management lines to better understand their views on water efficiency. This is because middle management also has an important role to provide value related to the water efficiency that is already mandated by upper management to the operational line management. In addition, middle management also intermediates the constraints, problems, solutions, innovation, strategy implementation, and operational coordination from the operational line management to upper management. With the delivery of suggestions from the operational line management, it is expected that top management can know and make decisions on those mentioned through middle level management. For further research it can broaden the scope of the research by interviewing middle to upper level management and can request data in the form of quantitative data on the efficiency of water use in the coffee shop.

#### 4. Conclusion

Water footprint and water efficiency are important in a single unit of value chain and can be applied to companies that directly use water in their production or indirectly. By knowing water footprint first, will be easier for the company or management to be able to create water efficiency in the production process. For line of operational management of course very base with SOP in company or effort, so that need a policy taken by level strategic related to existence of water efficiency. Although the SOP does not currently include any visible water efficiency, the operational line management of the coffee shop has realized that water efficiency is necessary. This is known during the dialogue with supervisors, baristas, and cashiers, they are quite surprised because it turns out a lot of water used to clean a coffee shop and takes a long time to wash their equipment. With the awareness of the operational line, it is expected to be key in decision making at the upper level of management level related to water efficiency.

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