

Automated Hand-Washing Stations Device with Combined Biodegradable Soap as Sanitary Response against Whooping Cough

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Abstract:

This project presented an affordable and sustainable solution to combat whooping cough and other cough related viruses. The automated hand-washing facility will be placed in high-traffic areas such school, public places, and hospitality and tourism industry that needs most clean water and proper sanitation and making more accessible. The development of automated hand-washing stations with biodegradable soaps helped every individual to protect themselves from viruses such as whooping cough. Thus, the biodegradable soap, made from local natural ingredients, has minimal environmental impact. The development of automated hand washing sanitation device with combined biodegradable soap promoted crucial hygiene practices and help prevent the spread of whooping cough and other infectious diseases. The project leverages are readily available technology empowers communities through local soap production and offers a scalable solution with significant potential to improve public health in resource-limited areas.

Keywords — Automated, Biodegradable Soap, Hand-Washing, Sanitary Response, Whooping Cough

I. INTRODUCTION

Whooping cough, a highly contagious respiratory illness spread through coughing and sneezing, poses a significant health risk, especially to unvaccinated infants. Frequent hand-washing is the most effective way to prevent its spread (Mitchell, 2014). In spite of this, access to clean water and sanitation facilities can be limited in resource-scarce areas. Traditional hand-washing stations often rely on piped water, which may be unavailable, or require significant infrastructure investment (Centers for Disease Control and Prevention, 2022). This lack of access to proper hand-washing facilities creates a

critical challenge in preventing the spread of whooping cough and other infectious diseases.

This project proposes a low-cost, sustainable solution, a hand-washing stations device with combined biodegradable. The automated hand-washing sanitation device is operated automatically through the use of solar panel system so that to ensure economically friendly systems. Thus, biodegradable soap minimizes environmental impact compared to conventional soap available in the market. By strategically placing these stations in high-traffic areas, such as schools, community centers, and public spaces where a large number of people gather, we can significantly increase hand-washing accessibility, particularly in areas where traditional hand-washing facilities might be lacking.

This approach directly addresses the challenge of limited access to proper hygiene practices, promoting a crucial preventative measure against whooping cough and other infectious diseases.

The project relies on several scientific principles. Basic filtration may be necessary to remove debris from the collected water from the water pipe before use. Biodegradation ensures the soap breaks down naturally, reducing environmental pollution. The technology involved is relatively simple, making the solution easily replicable and maintainable in various settings. This project combines readily available technology with sustainable practices to create a practical and effective response to promoting public health.

Statement of the Problem

The study aims to develop an automated hand washing sanitation device with combine biodegradable soap.

Specifically it answer the following questions:

1. How may the development of automated hand-washing sanitation device with combined biodegradable soap be describe in terms of:
 - a. Efficiency;
 - b. Reliability; and
 - c. Functionality?
2. Is automated hand-washing sanitation device with combined biodegradable soap help prevent the spread of virus like whooping cough?
3. What is the impact of automated hand-washing sanitation device with combined biodegradable soap to the hospitality and tourism industry in promoting public safety?

Conceptual Framework

Figure 1 shows the conceptual framework of the study. Despite the widespread concern in health care literature with patients' prioritizing public health safety is a significant action we need to pay attention especially when experiencing this kind of problems. The proposed solution to limited access to hand-

washing facilities and the subsequent spread of whooping cough is a low-cost, sustainable system of automated hand washing sanitation device with combined biodegradable soap.

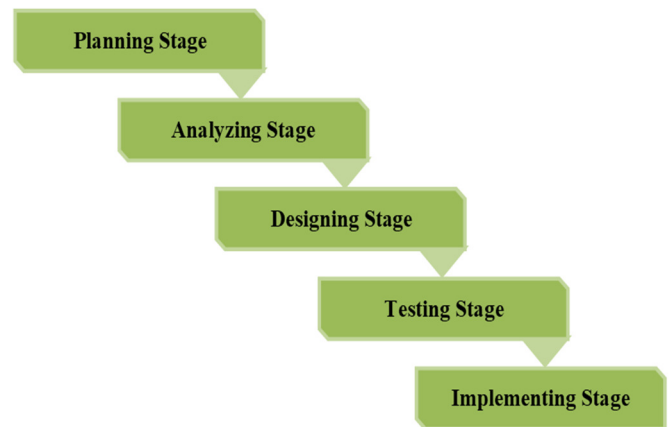


Fig. 1 Conceptual Framework

This project was champion using soap made from readily available, natural ingredients. This approach empowers communities to produce or source their soap locally, fostering self-sufficiency and economic opportunities. While commercially produced biodegradable soap remains an option, prioritizing locally produced, natural alternatives aligns with the project's focus on sustainability and community empowerment. Simple soap dishes will be provided for these bar soaps, ensuring ease of use and reducing reliance on plastic dispensers.

The project was initially focused on a targeted rollout in a community with documented challenges in accessing clean water and high rates of whooping cough. Schools, community centers, public spaces with high foot traffic, and healthcare facilities prioritized for station placement. Community engagement would be crucial for the project's success. Educational workshops were conducted to highlight the importance of proper

hand-washing and to ensure proper station usage and maintenance.

Altogether, this project holds significant potential to improve public health in resource-scarce areas. The project can significantly reduce the spread of whooping cough and other infectious diseases by increasing access to hand-washing facilities and promoting proper hand hygiene practices. Using accumulated rainwater and biodegradable soap promotes sustainability and minimizes environmental impact. The project's modular design allows for easy replication and adaptation to various settings, making it a scalable solution with the potential for broader public health benefits.

Research Problem

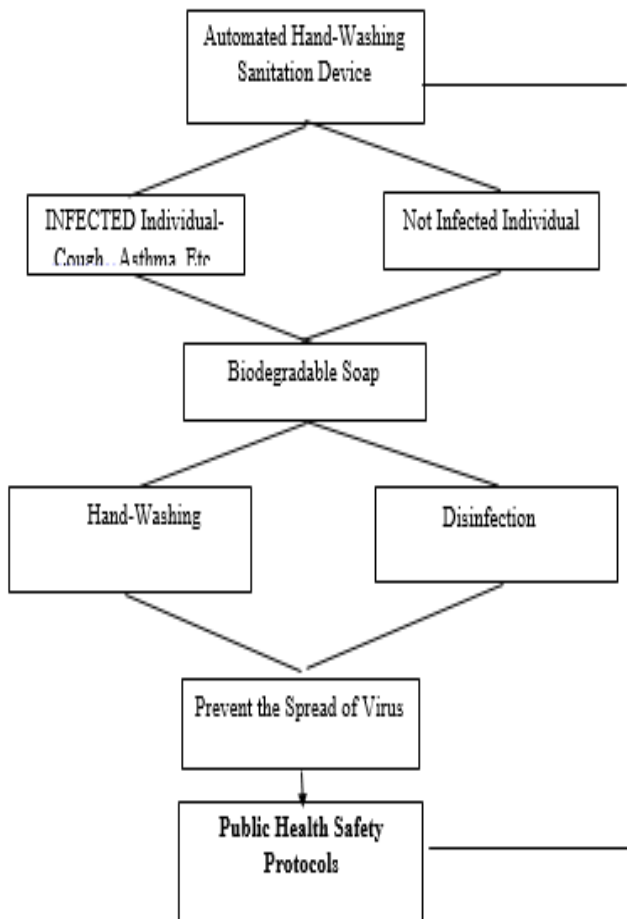


Fig. 2 Research Paradigm

Figure 2 shows the research paradigm of the study. As shown from the top is the automated hand washing sanitation device wherein those individual with respiratory problems or not are both enter or pass to the device for hand-washing, cleaning and disinfecting using biodegradable soap before entering within the vicinity of establishments or any places they will be visited. By this way, they will ensure to prevent the spread of virus specifically whooping cough or any respiratory infection diseases. And this will health any establishment to follow at least minimum guidelines and protocols dealing with public health issues for the safety of all.

Respiratory infections such as whooping cough, a highly contagious respiratory illness spread through coughing and sneezing, poses a significant health risk, especially to unvaccinated infants. Frequent hand-washing is the most effective way to prevent its spread (Mitchell, 2014).

Scope and Delimitation

The scope and limitations of the study was focused on the development of automated hand-washing sanitation device with combine biodegradable soap. It is limited to test the efficiency, reliability and functionality of the device to ensure public safety specifically to hospitality and tourism industry.

II. METHODOLOGY

The researchers used developmental and experimental research. Developmental research was used in this study to help the researcher in terms of planning and deciding on the device and to determine the impact to hospitality and tourism industry in providing public safety.

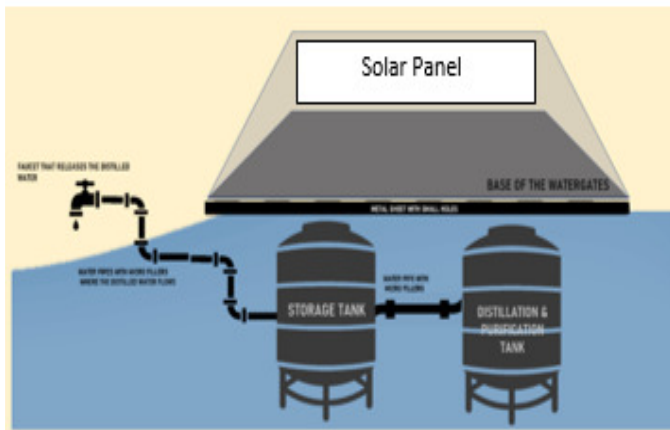
Developmental Stage

During the development stage, the researchers taught what the best place to use the device. By prioritizing the place with most number of individual visited, the researchers decided to

choose hospitality and tourism industry to help ensure follow at-least minimum health protocols against whooping cough in providing public safety. .

By identifying the problem, the researchers can focus on a specific concern: the development of automated hand-washing sanitation device with combined biodegradable soap. The device that could prevent the spread of virus such as whooping cough in all public places. To make the device work, several procedures should be taken for it to perform well and accurately, such as researches and data collection, determining the materials needed for the construction of the device, designing how the device will be described, after designing, prototype development will take in, that will go onto such as testing and validation, evaluation, and monitoring.

Figure 3 shows the possible design of the device.



Testing of the Device

Upon the development of automated hand-washing sanitation device with combined biodegradable soap it would be subjected for testing.

In the testing stage, the device were tested by some experts in the field to ensure the efficiency, reliability and functionality. The experts are the electrical and mechanical engineer together with programmer for the testing of device and chemist for biodegradable soap. The trial and error test re-conducted until the desired results were attained

Ethical Consideration

Upon development of the device, the researchers were followed guidelines and safety protocols to secure the safety of all involved. They also ensure that no harmful elements contained and used in the conduct of the study. The developed hand-washing sanitation with biodegradable soap were considered safe, valid, and reliable.

III. RESULTS AND DISCUSSIONS

A. Development of Automated Hand-Washing Sanitation Device with Combined Biodegradable Soap

TABLE I
 ASSESSMENT OF AUTOMATED HAND-WASHING SANITATION DEVICE

AUTOMATED HAND-WASHING DEVICE	Weighted Mean	Interpretation
Efficiency	3.45	Strongly Agree
Reliability	3.56	Strongly Agree
Functionality	3.77	Strongly Agree
Overall Weighted Mean	3.59	Strongly Agree

Table 1 shows the assessment made by the experts, as shown the overall weighted mean got 3.59 and interpreted as “Strongly Agree”. The functionality got the highest mean of 3.77, while the reliability got 3.56 and Efficiency got 3.45 and all are interpreted as “Strongly Agree”.

The findings meant that the developed hand-washing device with combined biodegradable soap found efficient, reliable and functional in proper hand-washing hygiene to prevent the spread of virus and public health safety.

Canlas, Soriano, Licup and Legamia (2014), the results found that there is a significant difference on the evaluation made by the respondents after testing both the devices based on functionality, usability, reliability, performance and supportability. But still they found positive significant effect to prevent spread of virus and performed hand hygiene.

B. Automated Hand-washing sanitation device with combined biodegradable soap

Based on the responses of respondents the automated hand-washing sanitation device with combined biodegradable soap was found effective to prevent the spread of virus and to maintain public health safety protocols in hospitality and tourism industry.

According to Europa (2021), the automated hand-washing technology removes 99.9 % of pathogens, reduce risk infection and improves hand hygiene performance. The pandemic such as COVID-19, whooping cough and other respiratory infections has reinforced the importance of effective hand-washing in all settings, but in particular healthcare. The gold standard in hand hygiene is correctly performed hand-washing with soap and warm water; and the importance of effective hand-washing cannot be overstated.

C. Impact of Automated Hand-washing sanitation device with combined biodegradable soap to the Hospitality and Tourism Industry in Promoting Public Safety

The Automated Hand-washing sanitation device with combined biodegradable soap to the hospitality and tourism industry in promoting public safety. Because it helps to promote better hygiene habits and encourage personal-hygiene for all individuals of all ages. Because virus and bacteria that cause infection can live on one's body and in the surrounding environment, prevention using this kind of interventions and practices encourage both personal and environmental disinfections.

IV. CONCLUSIONS

The automated hand-washing station with combined biodegradable soap found efficient, reliable and functional for hospitality and tourism industry to ensure proper hand-washing in preventing the spread of virus and public health safety.

Recommendation

Based on the findings of the study, It is recommended to develop hand-washing stations provide a critical source of clean water for hand

hygiene, improving overall health and reducing the spread of not just whooping cough, but other waterborne illnesses. It is also recommended to used biodegradable soap breaks down naturally, reducing environmental impact compared to conventional soap. This benefit protects local water sources and ecosystems, particularly in areas where these stations are densely deployed.

These developed automated hand-washing stations with combined biodegradable soap placed within the facilities that can promote proper hand hygiene among staff and visitors, and other individuals to ensure public health safety.

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