

Retractable Flexible Hose

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Abstract: Retractable Flexible Hose (RFH) is designed to keep pipes clean in public toilets. Materials used should be easy to maintain. As such, toilets are to be functional, clean, hygienic, accessible, and beautiful for all. Any toilet design should incorporate these basic requirements. For that, observations were carried out with different public toilet users from the users' perspectives. Descriptive findings show that RFH meets users' requirement which adopt modern toilet technology as tools in ensuring a hygienic and friendly toilet environment. As can be seen, there are different users of toilets in public spaces and this diversity and vulnerabilities must be considered when making decisions and developing a public policy for attending to all needs. Additionally, the public perspectives are important tool to identify demands and problems as public toilets are the equipment of direct user interface.

Keywords: Auto pull mechanism; water savings; aesthetic value.



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1. INTRODUCTION

The development of tourism industry has caused Malaysia to become one of the most attractive travel destinations in the world for leisure, business, and other purposes. There are many various places of tourism attractions in Malaysia. Well-equipped facilities such as public toilets are also provided in these tourist hotspots. Good maintenance and provision of facilities will provide comfort to users who will use the facility, but the management often overlooks the use of pipes in the toilet. Malfunctioning facilities resulting from poor toilet management, such as clogged toilets, stained facilities, and problematic flushing systems, were most cited as barriers to toilet hygiene practices (Sun KS, Lam TP, Tang WS, et al, 2021).

Innovations of water channels on toilets should be done to provide maximum comfort to users. In addition, keeping public toilet cleans can be considered as part of patriotism. Maintaining the cleanliness of public toilets means upholding the country's dignity. Local authorities should conduct regular supervision on public cleansing contractors who have been appointed to ensure that public toilets are in good condition and safe. Therefore, the authorities must intensify its public toilet campaigns.

2. BACKGROUND OF RETRACTABLE FLEXIBLE HOSE

There are many diverse and interrelated toilet issues including design, public health, social graciousness, cleaning skills and methods and also building maintenance. Retractable Flexible Hose controlled taps can be considered as one of the efforts to conserve water. Retractable Flexible Hose controlled taps with their precise flow settings and positive shutoff characteristics, offer effective means for providing adequate water flow when it is required. The innovation of this Retractable Flexible Hose, can roll back the pipe rubber that has been used. Hence, it will minimize hand contact. A clean toilet inspires confidence in them to use it more often. It is therefore important that the toilet is always kept clean. Cleanliness means not only an absence of dirt but also an absence of germs, marks, stains and so on. According to the impoverishment of quality of life connected with public toilets as an environmental inadequacy is traceable, estimable, and meaningful. The inconvenience of using deficient public toilets impacts people's daily lives, and may bring negative effects for those who frequently use public toilet.

3. IDEA OF PRODUCT INNOVATION

Keeping public toilets clean does not solely lie with the cleaners but it is a part of our responsibility as consumers. Furthermore, lack of a sense of belonging could be another factor of the low level of public toilet cleanliness. Having access to safe and clean toilets is part of human rights.

The study of the demand, acceptance, and tendency of users towards toilet cleanliness is based on several factors that have been identified to influence the level of cleanliness of public toilets. The factors that have been identified are as follows:

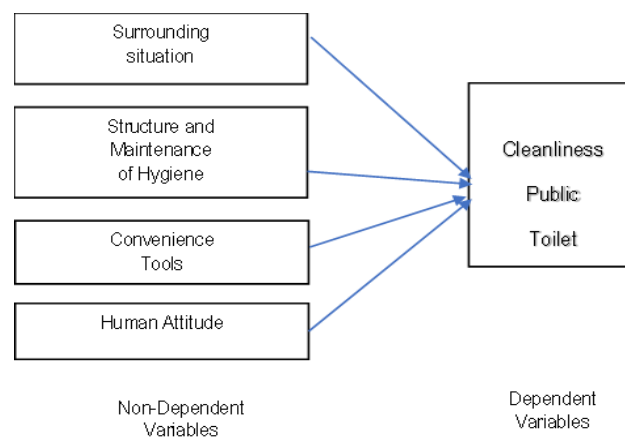


Figure 1: Conceptual Framework of the Study

The developed hose uses the same concept as hose reel used by the fire department of rewinding hose after use. Retractable Flexible Hose uses a spring that can pull the removed pipe back to its original place. The use of ball bearings can make rotation movements more effective. Ball bearings can be used in a variety of applications involving moving parts. It is also often used because it can represent radial load or thrust load and ball bearing is suitable for use because it can bear a load that is not too heavy.

The use of Hooke's law is applied in developing this innovation. In mechanics, and physics, Hooke's law for elasticity is an approximation that says that the elongation of a spring is directly proportional to the load added to it if the load does not exceed its elastic limit, that is, if the spring is not stretched or compressed beyond its elastic limit. for example, when a spring is stretched to the left,

it will pull back to the right. Most springs rely on Hooke's law, which states that the force with which a spring pushes back is directly proportional to the distance from its length.

The use of this developed Retractable Flexible Hose bracket can provide convenience and efficient use of space in the toilet. Its unique shape and made of aluminium improve accessories in public toilets. The Retractable Flexible Hose system is easy to use without having to open the faucet. The hose bracket can be attached to the toilet wall to save more space by using the concept of a rewind mechanism. This concept is used in designing a pipe hose system that is anti-contaminated and dirty. The length of the pipe that can be pulled has been set to no more than 1.5m.

Therefore, with the innovation of this Retractable Flexible Hose, it can roll back the pipe rubber that has been used to protect the pipe rubber from being damaged and contaminated and make public toilets more comfortable to be used. Indirectly clean public toilets can prevent the spread of disease. This pipe is only reserved for toilet use only.

4. BENEFITS OF INNOVATION

According to Norhanis (2013), good and satisfactory toilet hygiene can give comfort to users to use it. Meanwhile, the level of toilet cleanliness is unsatisfactory and smells cause discomfort among users. Among the problems that are often faced by users when using the toilet is the state of dirty pipe rubber with water moss around the rubber. This is because the rubber pipe is too long to reach the toilet floor. In addition to the type of pipe rubber that is stuck, it can cause the pipe rubber hanger to be torn off or broken due to frequent use. Sometimes there are a few users who do not stick the rubber pipe back to the original place that has been prepared and left on the floor.

In addition, the rubber that is commonly used will be more prone to damage such as leaking or being easily detached from the pipe head. This can be seen because the pipe size is too small or too big on the pipe head. This kind of situation is often experienced by users when they want to use a rubber pipe when suddenly the rubber hose is pulled out and water will pour out. Sometimes this host disappears and is not in its original place.

Waste often occurs when users forget to turn back the faucet to shut off the water. Improving conventional pipes through a flexible hose with a bidet spray hose head can curb the problem of water wastage due to forgetting to close the water tap. The user needs to press the trigger to allow the water to flow out. Once the trigger is released, the water will automatically stop flowing out. Water saving for the conventional use of rubber pipes is less than satisfactory, so the use of auto pull hoses is replaced with conventional rubber pipes.

According to Corradi, G., Theirs, C., Garcia-Garzon, E. & Barrada, J.R. (2023) the impoverishment of quality of life linked to public toilets as an environmental inadequacy is traceable, estimable, and meaningful. Therefore, a pipe system is developed so that cleanliness is at the maximum level for users with hoses that have been modified using flexible and auto-pull concepts for re-storage after use. The hose should be installed at an appropriate height that allows the end of the hose to reach close to the user's body during use, but not reach the floor when the hose is released. The Retractable Flexible Hose produced will be tested to determine the level of capability in terms of its functionality.



Figure 2: Conventional Hose Pipe

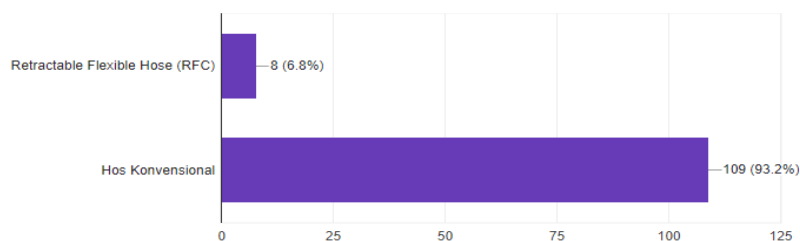


Figure 3: Retractable Flexible Hose

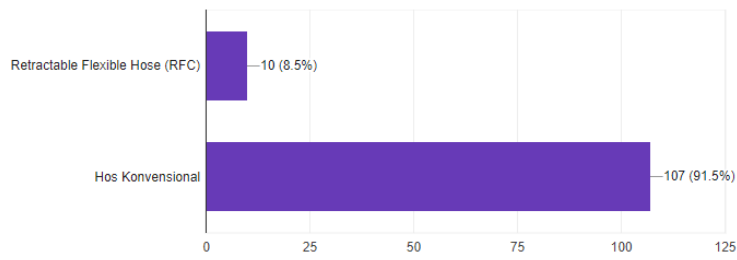
5. FINDINGS

Questionnaires were distributed in getting the users' perspectives between Conventional Hose Pipe and Retractable Flexible Hose. This survey involved 117 respondents in order to express their opinion on these two types of hose pipes. Data were analyzed using constant comparison.

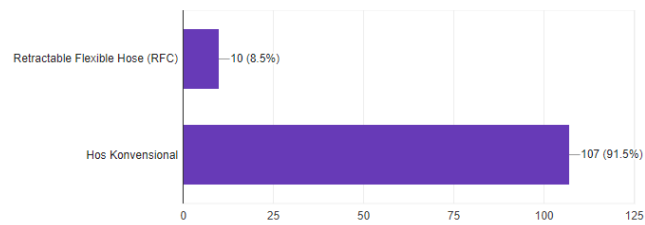
- i. The water pipe hose used is often in the toilet bowl or on the floor.



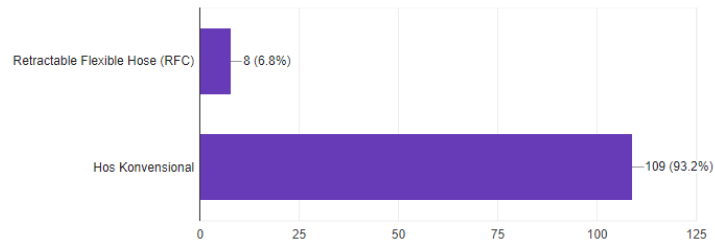
- ii. Water pipe hoses used by consumers often detach from the faucet head.



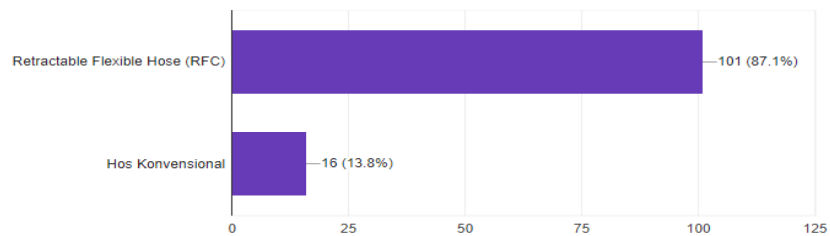
- iii. The water pipe hoses used by consumers are always leak.



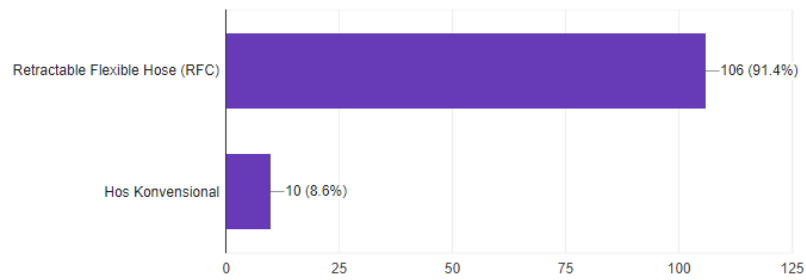
- iv. Users feel that the water pipe hose is dirty.



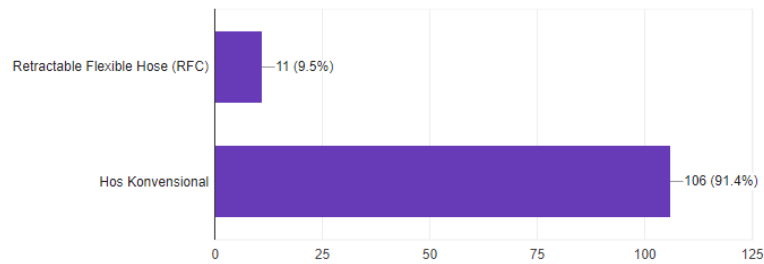
- v. The water pipe hose is always in its original shape and place.



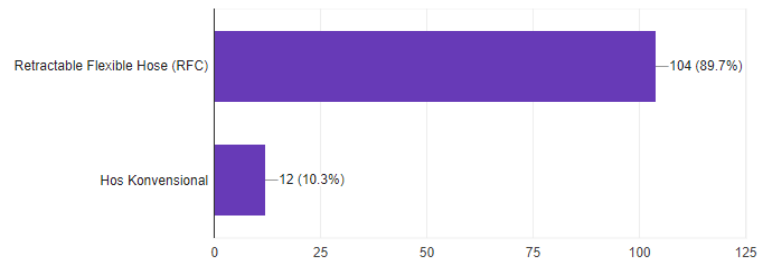
- vi. There are no problems with rubber pipes such as tearing, leaking, and being pulled out.



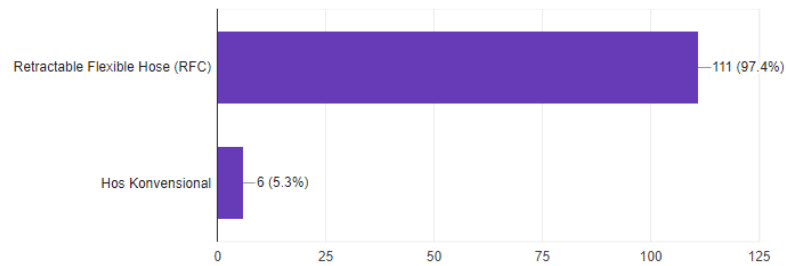
- vii. Users find that there is often a waste of water in the toilet.



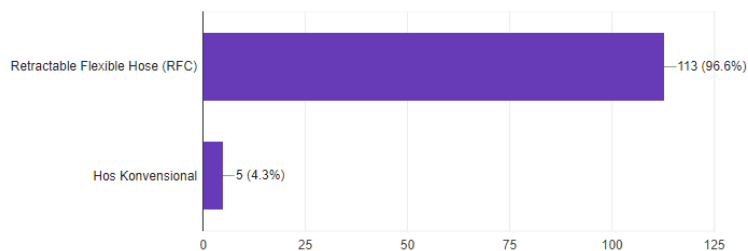
- viii. Users find that there is no waste of water in the toilet.



- ix. Water pipe hoses are always clean.



- x. This type of faucet is more attractive and can improve the value of the toilet.



6. POTENTIAL COMMERCIALIZATION OF PRODUCT INNOVATION

Retractable Flexible Hose is a hose system that can pull back the pipe rubber used on the toilet. With this Retractable Flexible Hose, the tidiness of the pipe in the toilet will be more guaranteed in terms of hygiene because it can pull the pipe depending on its use. A Retractable Flexible Hose is suitable to be used for all types of toilets, especially public toilets. Public toilets are toilets that are often used by visiting tourists or residents.

Therefore, it is normal that they expect a toilet that will be used by them is clean and comfortable. This not only has a positive impact on the cleanliness of the toilet, but it also gives comfort to the users who use it. Besides that, users also do not have to feel disgusted when using rubber pipes like they usually found in public toilets.

The hose's flexible innovation has been modified using the auto-pull concept for re-storage after use for the convenience of users using a cleaner pipe and comfortable and it is suitable to be used for all ages. The Retractable Flexible Hose is to replace the existing conventional rubber pipe by developing innovation flexible hose. The Retractable Flexible Hose is well organized pipe system with aesthetic value added to toilet accessories. No water wastage happen as the auto piping system stops the tap.

Musa H., Bashir U.M., Kyari M.H. (2022) in their initial research mentioned that the most important spaces in any building of anthropogenic character is public toilet. They are places used by people from all walks of life from different ages, gender, cultures and religions. It is regarded as a very important space in any building and environment, aesthetically designed and architecturally unmistakable.

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