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IMPACT OF INTENTION TO USE REUSED WASTEWATER FOR COMMUNITY SATISFACTION IN VIETNAM

在越南，为了社区满意度而使用再利用废水的意图的影响

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Abstract

The paper aims to evaluate factors according to the planned behavioral theory of the community's intentional attitude towards wastewater reuse. A huge amount of domestic wastewater will deplete water resources if not treated and reused. The survey results from more than 1000 households in the three major cities of Vietnam (Hanoi, Ho Chi Minh, and Da Nang) show that the community's intention is good and all have a positive impact on the people's satisfaction and water cycle management performance. All five factors: emotion, fairness, health risk, subjective norm, trust, have a positive impact on intention to use reused wastewater. Different from other studies, this research assesses the impact of intention to reuse wastewater on community satisfaction. Previous research showed that health risk negatively influenced intention; this study showed that health risk positively influenced intention and community satisfaction.

Keywords: Reused Wastewater, Community Satisfaction, Vietnam, Water Cycle Management, Health Risk

摘要 本文旨在根据社区对废水回用的有意态度的计划行为理论来评估因素。大量的生活污水如果不进行处理和回用，将会耗尽水资源。 对越南三大城市（河内，胡志明，岘港）1000 多户家庭的调查结果显示，社区意愿良好，对人们的满意度和水循环管理绩效都有积极影响。情感，公平，健康风险， 主观规范，信任这五个因素都对回用废水的使用意愿产生积极影响。与其他研究不同

，本研究评估了废水回用意愿对社区满意度的影响。先前的研究表明，健康风险对意图产生负面影响； 这项研究表明，健康风险对意愿和社区满意度产生积极影响。

关键词: 废水再利用、社区满意度、越南、水循环管理、健康风险

I. INTRODUCTION

Water is the essential resource for human life, the sustainable development of all countries, and a top priority for sustainability. Sustainable development is not a new concept but is already being used in the management of renewable resources. People are fully capable of making development sustainable, ensuring that resources meet their current needs without detrimental to meeting the needs of future generations, while at the same time reducing minimizing damage to the socio-economic system and the environment. Water is an indispensable basic element in maintaining life and all human activities on the planet. Satisfying the demand for water in both quality and quantity is a prerequisite for sustainable development.

Since the beginning of the 20th century, global water consumption has increased sevenfold, mainly due to population growth and individual water needs. Along with the population growth and aspirations to improve the lives of each nation and each individual, the increasing water demand is inevitable. Thus, in practice ensuring adequate water supply for the entire global population and conservation of ecosystems remains a distant goal. Nowadays, due to variations in temperature and precipitation, many places often do not have enough water to meet demand. Therefore, in the 21st century, water shortages will be the most serious of all water problems, threatening sustainable development. According to many research institutions on water resources, currently, about 1/3 of the countries in the world have water shortages. By 2025, this figure will be 2/3, with about 35% of the world's population falling into serious water shortages. In some countries, the amount of water per capita is significantly reduced. The United Nations Water Conference in 1997 agreed that "All people, regardless of age, economic and social status, have the right to access drinking water with a guaranteed quantity and quality". Accordingly, access to drinking water is a basic human right. However, up to now, the number of people who lack safe drinking water is constantly increasing [4]. Therefore, water concerns are not unique to a single nation.

Vietnam is facing increasing environmental pollution due to rapid urbanization, especially in big cities. Over the past 20 years, the Government of Vietnam has developed many policies, issued many legal documents on urban sanitation, and invested in this area, including investment in building systems. Drainage and wastewater treatment. Vietnam charges a drainage fee at 10% of the clean water tariff; the ability to recover construction investment costs and overall O&M costs is generally low.

According to statistics, up to 9,000 people die each year, 100,000 cases of cancer are mainly caused by using polluted water. In 37 communes called 'cancer village', 1,136 people died of cancer. In addition, 380 people in the neighboring communes also died from cancer. The above situation requires our State to synchronously implement measures to control the waste discharge and treat wastewater, step by step reduce pollution and protect the water environment. It can be seen that since the process of reform and opening up economic development up to now, in addition to completing the market economy institutions, our State has also issued the Law on Environmental Protection in 2014 and other legal documents on environmental protection, including regulations on water environment protection. However, besides the achieved results, the practical implementation of the provisions of the law on environmental protection in general and regulations on the environmental treatment of wastewater in particular still has shortcomings.

Less than 10% of urban wastewater in Vietnam is centrally treated. The majority of urban households use inadequately maintained on-site sanitation, for example, septic tanks. These facilities only partially treat wastewater and pollute groundwater and surface water. The continued discharge of untreated or partially treated domestic and industrial wastewater poses a risk to the nation's increasingly depleting freshwater resources. The availability of good quality freshwater in some river basins in Vietnam is threatened, especially during the dry season. In a country with approximately 3,000 km of coastline and increasing pressure from climate change, coastal areas and coastal cities are particularly sensitive areas. Shortages of freshwater during the dry season exist and will become more severe in some river basins. Lack of water, or lack of water of adequate quality, contributes to food and energy shortages while increasing food prices. Many places are using groundwater as a source of irrigation, domestic or commercial water, increasing the risk of these sources being polluted by on-site sanitation systems or by the increased saline intrusion [11]. Vietnam's urban population is growing at the fastest pace in Asia, fueled by an expanding economy based mainly on industrialization. In fast-growing cities with rapidly increasing population densities and per capita water consumption, more environmentally sustainable wastewater treatment measures are needed, in parallel with the operation and proper maintenance of on-site and external wastewater treatment facilities. With Vietnam's transition to middle-income status, both central and local governments need to invest in protecting the health of their people, now and in the future, especially protect against the destruction of freshwater resources.

Currently, Vietnam has two urban wastewater management company models: (a) one member state limited liability company and (b) joint stock company. For joint stock companies, the state holds 51% of the shares; the rest are held by employees in the company and by outside shareholders. Most of these companies operate under a 'city-by-order' mechanism and are paid directly by the city budget. The mechanism of using a budget that has been set up and approved in advance to cover the activities of the year makes these companies unable to invest in research - development or optimization of wastewater treatment systems. These companies often have difficulty getting funding for major repairs, as these unplanned expenditures often require approval from another city administration. Usually, it takes a long time to get approved, resulting in a company failing to provide services.

Strong, well-qualified businesses often appear in localities where only one unit is responsible for providing public services for drainage and wastewater treatment, water supply, solid waste management, and management of trees, roads, and sidewalks. In some cities, management of the urban drainage system is assigned to two or more organizations. In Bac Giang, for example, the drainage network is operated and maintained by Bac Giang Urban Works Management Joint Stock Company, while the main drainage canals, main sewers, pumping stations, and wastewater treatment plants are again operated by the Bac Giang Anti-Flood Pumping Center. In Da Lat, the rainwater drainage network was managed by the Urban Construction Company, while the wastewater drainage network (separate drainage) and the wastewater treatment plant were operated by Lam Dong Water Supply and Sewerage Company. Broken management responsibilities make it difficult for companies to coordinate and reduce the efficiency of investment sources. Discrete management assignment is also a problem in most cities. Here the community and local government are responsible for household connection and the tertiary wastewater collection network. At the same time, the municipal sewerage company is responsible for managing the main sewers and the water treatment plant waste. In addition, due to the lack of contact and interaction between service buyers and sellers due to lack of uniformity in management, people cannot reflect on problems or dissatisfaction with service quality and will not be willing to pay for this service.

II. LITERATURE REVIEW

A. Overview of Water Resources in Vietnam

Vietnam has 3450 rivers and streams with a length of 10 km or more. These rivers and streams are located in 108 river basins which are distributed and spread across the country.

Located in the monsoon tropics, Vietnam is considered a country with abundant water resources in terms of rainfall, surface water in river systems, lakes, and underground water.

Rainfall: the average annual rainfall of Vietnam is about 1940-1960 mm (equivalent to the total amount of water, about 640 billion m3 / year), among countries with a large amount of rainwater in the world. However, the rainfall in Vietnam is very unevenly distributed over time and space. Rainfall is mainly concentrated in 4-5 months of the rainy season (accounting for 75-85% of the total annual rainfall); the rainfall in the dry season only accounts for 15-25%. The areas with heavy rainfall are the areas east of the Truong Son in the North Central, Central Central, Central Highlands, and the midland and mountainous regions of the North.

In terms of surface water: the total annual flow is about 830-840 billion m3, of which concentrates mainly (about 57%) in the Mekong River basin, more than 16% in the Red-Thai Binh river basin, more than 4%. in Dong Nai river basin, the rest in other river basins. However, the amount of water generated in the Vietnamese territory only accounts for about 310-315 billion

m^3/year (about 37%), mainly in the Red-Thai Binh, Dong Nai, Ca, Ba, Vu Gia basins -Thu Bon.

B. Forms of Reusing Domestic Wastewater

The World Health Organization recommends using reusable domestic wastewater in the following four areas:

1) Urban Wastewater Reuse

A large amount of urban water demand does not require as high water quality as drinking water. Urban domestic wastewater has been treated depending on demand. It can be reused for the following purposes: Watering trees, washing roads, washing the toilet, providing water supply for fire fighting, regenerating the landscape of rivers and urban lakes.

2) Agricultural Wastewater Reuse

Agroforestry is the most important production sector for Vietnam's development. Agricultural production is also the industry that uses the most water. First of all, the use of treated water to irrigate crops needs to know the quality of the wastewater, especially the indicators of Nitrogen, Potassium, and various trace elements such as zinc and sulfur that are indispensable for plants. However, in some cases, these substances should not exceed crop requirements, avoiding contamination of shallow groundwater sources.

3) Reuse of Wastewater in Industrial Production

Industrial wastewater flow accounts for about 20% of global freshwater. It is forecasted that water demand by 2025 will increase by 1.5 times [10]. Therefore, reusing industrial wastewater brings general benefits to the environment and significantly reduces production costs, recovering water resources, especially related costs, wastewater treatment, and discharge into receiving sources.

4) Reclamation of Groundwater

Reclamation of groundwater can help prevent subsidence, reduce groundwater level, prevent saline intrusion, maintain groundwater resources for future needs.

C. Reused Water Quality Standards in the World

The physical and chemical properties and the concentration of pollutants remaining in reused water are of primary concern when setting the quality standards of reused water. In wastewater, the indicators of salinity, trace elements, residual chlorine, pH, COD, BOD, DO, or nutrients such as Nitrogen, Phosphorus are often much higher than groundwater or surface water. Therefore, when using water after treatment and for different purposes, it is necessary to pay attention to the demand and use the water to take measures to control and promptly overcome the potential adverse factors.

In the scope of the article, it will only mention the quality requirements of reused water for urban purposes. Post-treatment domestic wastewater is used in urban sanitation such as watering plants, washing roads, fire fighting. Quality standards of treated wastewater used in urban areas are often much higher than wastewater reuse in agriculture [12].

Most developed countries, such as the US, UK, Australia, Japan, have standards for reusing urban wastewater. In addition, developing countries such as Kuwait, Tunisia, and Oman have their own standards of reusing wastewater.

D. Behavioral Theory

The Theory of Planning Behavior [1] is a theory that expresses the relationship between one's beliefs and behaviors, in which beliefs are divided into three categories: beliefs about behavior, beliefs according to common norms, and belief in self-control.

Icek Ajzen initiated this concept in 1991 to improve the predictability of the Theory of reasoned action by adding to the model of cognitive factors, behavior control, which has many advantages in predicting and interpreting an individual's behavior in a certain context [1]. It is considered one of the most widely applied and cited theories of behavioral theory [3]

The theory has been applied to studies in different fields such as advertising, public relations, advertising campaigns, health, and sports.

The planned behavioral theory (PBT) was developed from the theory of reasoned action [2], which was created to overcome the limitation of the previous theory of assuming the behavior of Human beings are completely controlled by reason.

According to the Reasoned Action Theory, if a person has a positive attitude toward the behavior and their important people also expect them to perform the behavior (i.e., the subjective criterion factor), then the outcome that they have a higher degree of behavioral intent (more motivated) and more likely to act (implement the intent). This has been proven in many studies, confirming the link between attitudes and subjective criteria for behavioral intent and then behavior.

However, there are still many controversies about the relationship between behavioral intentions and actual behavior; the results of some studies show that behavioral intentions do not always lead to realistic behavior because of limitations in the circumstances. If an individual lacks behavioral control, the behavioral intention is not the deciding factor in performing the behavior. Ajzen introduced the Theory of Planning Behavior by adding a new factor, awareness of behavior control. He expanded the theory of reasoned action to include irrational factors to increase the accuracy of behavioral prediction models.

III. RESEARCH METHODS

A. Research Background

Due to their particular characteristics, major cities such as Hanoi, Ho Chi Minh City, and Da Nang are considered separately. In these cities, the goal of sewerage and wastewater treatment infrastructure development is to address important urban sanitation problems related to crowded densities; and the lack of sewerage facilities grows increasingly.

Hanoi is the first major city in Vietnam to develop a drainage infrastructure. Two JICA funded wastewater collection and treatment systems serving Kim Lien and Truc Bach lakes have been in operation since 2005. These two stations have a small capacity (Kim Lien has a capacity of 3,700 m3 / day, and Truc Bach has a capacity of 2,300 m^3/day). This is a pilot project for local authorities to understand better how to apply urban sanitation. in major city areas. These wastewater treatment plants help reduce pollution of the ditches and lakes that receive untreated stormwater and wastewater. Both stations apply improved activated sludge technology (A2O). Each station only handles a small part of the drainage area.

After that, the other project sponsored by JICA is the North Thang Long Wastewater Treatment Plant, which was built to serve the residential area with an estimated population of 150,000 people. Although the plant has been in operation since 2009, the common sewer system that the local authorities promised to build to serve this area has not been constructed. This component is not funded by JICA but funded by JICA from the local budget. The government has to decide to direct the pre-treated wastewater with a flow of 7,000 m^3/day from a nearby industrial park to North Thang Long factory for further treatment; however, this amount is only 17% of the total designed capacity of 42,000m^3/day. This situation shows that it is necessary to construct wastewater collection and treatment facilities synchronously to avoid wasting investment capital.

In Ho Chi Minh City, there are three typical projects on urban sanitation development. The first is a project funded by the Belgian government in Binh Hung Hoa, treating wastewater from a common sewer system. The aerobic and biological lakes system is built on a fairly large area (37 hectares). This system is a unique, low-cost technology that helps treat wastewater in this densely populated urban area. The plant receives wastewater with a low concentration of pollutants and is processed to meet environmental standards. Binh Hung Hoa factory has operated since 2006; it has a design capacity of 46,000m^3/day but currently only handles 30,000m^3/day.

In Da Nang, the city uses a common drainage system to collect wastewater for four treatment plants applying the same technology as an anaerobic lagoon covered with tarpaulins. Initially, these plants were designed as uncoated anaerobic lakes. However, due to the proximity of the plant to residential areas and problems with odor pollution, all of these lakes have been financed by the World Bank to cover up. With a total designed capacity of 64,400 m^3/day, four wastewater treatment plants in Da Nang serve 378,000 people, equivalent to 40% of the city's population. However, it is necessary to pay attention to the characteristic of the common drainage system that the concentration of organic matter (BOD) is low, so wastewater treatment is not necessary in the rainy season; This situation prevented the operators from using pumping stations with wells separating rainwater, and the mixture of wastewater and stormwater was released into receiving sources, including beaches on Son Tra peninsula.

B. Research Sample

We sent surveys to 2,000 people in Hanoi, Ho Chi Minh City, and Da Nang city within three months, we collected 1255 votes. After cleaning the data, there were 1009 valid votes to analyze and test research hypotheses.

C. Research Model

Behavioral theory intends to maintain the key assumptions contained in Planning Action Theory.

Derived from the assumptions in TRA, the individuals' intentions largely reflect their personal attitudes or their perception of how beneficial action is. This will also be influenced by their cognitive beliefs and perceptions of this action [9, 10].

Again, as in the TRA, the subjective standards the individuals are exposed secretly influence their intentions. It should be recognized that man is, in essence, a social creature, so he will have no doubts about what others think or believe. More often than not, if society shows general support for an action, it is very likely that the individual will think the same way, largely shaped by the degree of acceptance (and disapproval) of family, friends, colleagues, or many beautiful people he trusts.

The individuals' intentions and resulting behaviors are influenced by perceptions that control their behavior or thoughts and beliefs in their ability to perform or participate in the aforementioned behaviors. The successful documentation on the TPB has led to the identification of two obvious aspects of this cognitive-behavioral control:

Internal Control: This is basically how the individual perceives his own control. It focuses on how the individuals see themselves in control when performing the particular behavior in question. This is primarily related to the completeness of their knowledge, skills, abilities, and the level of discipline they use while performing the act.

External Control: Other external factors have a way of shaping the way an individual behaves. For example, the acceptance or approval of family, friends, and co-workers is likely to influence a person who develops a positive attitude toward an act, motivating his intention to see the particular action can come to an end. Time is another external factor, but it certainly affects a person's level of behavioral control [5].

Ajzen's Theory of Planning Behavior [1] suggests that a person's behavior can be predicted from their behavioral intentions. This intention is in turn determined by the attitude (towards the particular behavior), Subjective norms (the influence of others significantly to support behavior), and Cognitive behavior control (how easy or difficult to do the behavior).

Emotions: the extent to which a person feels negative or positive feelings towards the recycled water program.

Attitude: the extent to which one believes supporting the recycling water program will yield positive results.

Subjective norms: the degree of pressure and influence one has from others to support the program.

Risk perception: the degree of risk a person is perceived to be concerning the program.

Cognitive control: the degree of control a person feels they have over their water source and quality.

Knowledge: a person's level of knowledge about water issues and the use of recycled water for supply plans.

Confidence: the degree to which a person has confidence in the agencies involved in implementing and administering water recycling programs.

Responsibility: the degree to which one assesses the relative responsibility of individuals, communities, and authorities in ensuring there is enough water for the future.

Environmental obligations: the degree to which a person feels obligated to protect the environment.

Intentional behavior: an intention to behave in a manner that supports or rejects the recycled water program (e.g., intending to drink water; intent to eat irrigated product).

The developed model is shown in Figure 1.

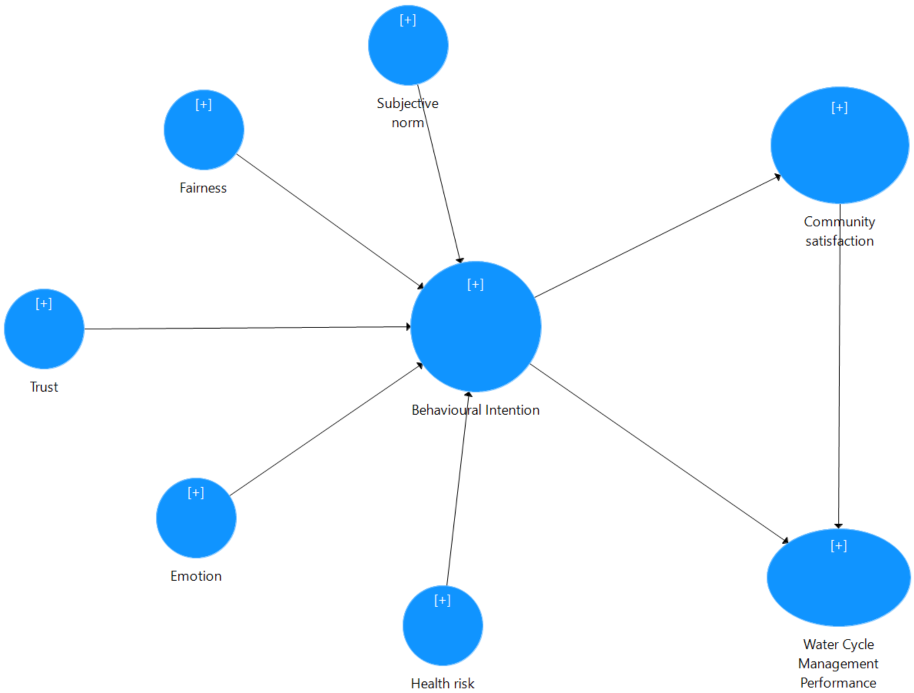

Figure 1. Research model

The Fairness Scale was developed to measure an individual's assessment of whether the recycled water program is deemed fair overall and for many different users.

Community satisfaction includes the following scales:

Satisfaction with present life after reuse of formed wastewater (SAT1).

The formation of domestic wastewater reuse has a more positive impact on all aspects of people's lives and livelihoods (SAT2).

The community where you live is ideal (SAT3).

Water cycle management performance recognizes the reciprocal relationship between human water use and the role of water cycle management in the environment, using key principles:

• Conserving water - minimizing water use and loss by reducing demand and by maximizing efficient use and reuse;

• New Supply Diversity - consider all potential water sources when new supplies are needed, including water and rainwater reuse;

• Water quality - manage the water cycle at all stages to maintain water quality for the community and the environment; and

• In accordance with the purpose water quality - towards a water supply quality that is not better than that required for the intended use, i.e., not providing drinking water for uses that do not require drinkable quality [4].

D. Research Hypotheses

H1: Trust has a positive impact on intention to use recycled wastewater.

H2: Emotion has a positive impact on intention to use recycled wastewater.

H3: Fairness has a positive impact on intention to use recycled wastewater.

H4: Health risk has a positive impact on intention to use recycled wastewater.

H5: Subjective norm has a positive impact on intention to use recycled wastewater.

H6: Intention to use recycled wastewater has a positive impact on community satisfaction.

H7: Community satisfaction has a positive impact on water cycle management performance.

H8: Intention to use recycled wastewater has a positive impact on water cycle management performance.

E. Analytical Techniques

Investigation data will be processed using PLS-SEM software [6, 7]. For measurement models, test the scale with the combined reliability, the convergence value, the unidirectional calculation, and the discriminant value. The structure model is evaluated through Bootstrapping (N = 5000), R^2 - Determination coefficient, f^2 - Impact level.

Step 1: Determine Cronbach's Alpha to test the scale

Step 2: Analyze EFA - Factor of discovery

Step 3: A scale model of the resulting form is verified

1. CR - General reliability: ≥ 0.7

2. Convergence value:

- rho_A:> 0.7;
- AVE - Variance extracted: ≥ 0.5;
- External load factor of observed variables ≥ 0.7.

3. Distinguishing values: The correlation coefficient on the top of the column is greater than the remaining coefficients of that column (Matrix Fornell - Larcker).

4. The phenomenon of multi-collinearity: VIF <5.

5. Evaluate the model's suitability with data collected in the market:
- SRMR < 0.082 (but also acceptable when SRMR <0.12);
- d_ULS: < 95% [8].

Step 4: Conduct Inner model evaluation: the inner model/structure is evaluated through the following criteria:

1. R^2 - Coefficient of determination: Acceptable level based on specific research context.

2. f^2 - Influence level:
- If $f^2 = 0.02$, the degree of influence is weak
- If $f^2 = 0.15$, the level of influence is moderate
- If $f^2 = 0.35$, the degree of influence is strong.

3. Estimation of path coefficient: Analyze and evaluate significance, confidence interval

4. Test the mediated relationships based on the approach of Zhao et al. [13]:

1) Complementary or partially indirect: a form with direct and indirect effects in the same direction and statistical significance.

2) Competitive or partly indirect intermediation: A form with direct and indirect effects in different directions and are statistically significant.

3) Only indirect effect (Indirect-only mediation) or completely mediated: A form with direct impact has no statistical significance, but the indirect effect is statistically significant.

4) Direct-only non-mediation: A form that is statistically significant for a direct impact but not statistically significant for an indirect effect.

5) No-effect non-mediation (No-effect non-mediation): A form that is not statistically significant for both direct and indirect effects.

With Smart PLS software, researchers can mediate variable testing with built-in Boostrap. That is, PLS-SEM can assess the significance level of direct and indirect effects. On that basis, it is possible to confirm that the mediating relationship belongs to any of the five categories mentioned.

IV. Results and Discussion

The results of testing the reliability of the scale show that all scales satisfy the conditions. Next, we analyze the discovery factor EFA with the following results:

The factors of the independent variable give the results KMO = 0.855 > 0.5 and Sig = 0.000 < 0.05. The results of EFA analysis showed that the eigenvalue index was 2.188 > 1 and the cumulative variance of 68.121% > 50%. Therefore, the variance of extraction is satisfactory.

The dependent and endogenous variables gave the results KMO = 0.866 > 0.5 and Sig = 0.000 < 0.05. EFA analysis showed that the eigenvalue index was 2.732 > 1 and the cumulative variance of 63.22% > 50%. Therefore, the variance of extraction is satisfactory.

The study uses the Consistent PLS Algorithm method to evaluate the measurement model. Table 1 shows the results of Cronbach's Alpha coefficients, Composite reliability, AVE – Average extracted variance, and load coefficients of observed variables of the scales in the model.

Table 1 shows that the scales have aggregate confidence greater than 0.7. Thus, the reliability and convergence value of the scales are satisfactory. The average variance of the scales has equal values > 0.5.

Table 1.
Reliability and validity construct (SmartPLS output)

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Behavioral Intention	0.981	0.981	0.981	0.668
Community satisfaction	0.920	0.920	0.920	0.697
Emotion	0.928	0.928	0.928	0.682
Fairness	0.911	0.911	0.911	0.672
Health risk	0.872	0.872	0.872	0.694
Subjective norm	0.910	0.911	0.910	0.629
Trust	0.898	0.898	0.898	0.638
Water Cycle Management Performance	0.947	0.951	0.947	0.645

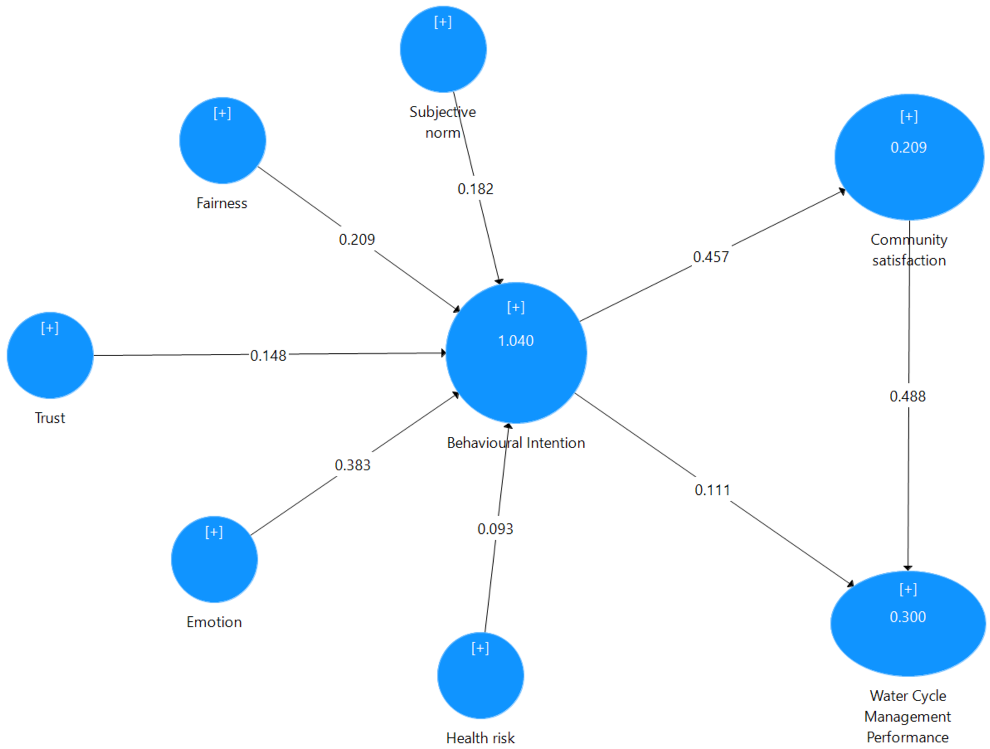

Figure 2. PLS results

The results show that all research variables are satisfied (Table 2). The study used the Fornell-Larcker Criterion to evaluate the differential values of the latent variables in the model. Table 3 demonstrates that all square root values of AVE of each research variable are greater than the correlation coefficients between that variable and the rest of the model. Therefore, the scales of the research variables are of distinctive value.

The results show that the variables in the model explain quite a lot of the variation of the dependent and endogenous variables.

Table 2.
Discriminant validity results according to the Fornell-Larcker criterion (SmartPLS output)

	Behavioral Intention	**Community satisfaction**	**Emotion**	**Fairness**	**Health risk**	**Subjective norm**	**Trust**	**Water Cycle Management Performance**
Behavioral Intention	0.817							
Community satisfaction	0.157	0.835						
Emotion	0.021	0.161	0.826					
Fairness	0.012	0.350	0.188	0.820				
Health risk	0.016	0.230	0.094	0.167	0.833			
Subjective norm	0.041	0.474	0.030	0.020	0.037	0.793		
Trust	0.038	0.470	0.026	0.009	0.022	0.049	0.799	
Water Cycle Management Performance	0.334	0.239	0.333	0.330	0.316	0.327	0.367	0.803

Table 3.
R-Square results (SmartPLS output)

	R-Square	**R-Square Adjusted**
Behavioral Intention	0.440	0.441
Community satisfaction	0.209	0.207
Water Cycle Management Performance	0.500	0.529

Table 4.
F-Square results (SmartPLS output)

	Behavioral Intention	**Community satisfaction**	**Emotion**	**Fairness**	**Health risk**	**Subjective norm**	**Trust**	**Water Cycle Management Performance**

Behavioral Intention		0.264						0.231
Community satisfaction								0.269
Emotion	0.212							
Fairness	0.209							
Health risk	0.228							
Subjective norm	0.155							
Trust	0.264							
Water Cycle Management Performance								

The F-square values are all greater than 0.15, indicating that the variables have a qualifying relationship to test the suitability of the model and test research hypotheses. Next, the appropriateness of the model was determined on the SRMR basis.

Table 5.
Model fit summary (SmartPLS output)

	Saturated Model	Estimated Model
SRMR	0.055	0.055
d_ULS	6.436	6.477

As shown in the table above, we can see that the SRMR of the critical model is 0.055 and the SRMR of the estimated model is 0.055, both less than 0.12. Therefore, it is possible to conclude that survey data and market data have the compatibility to meet the requirements.

Use Bootstrapping with N = 5000 to test the structural model. If the p-value is less than 1%, 5%, and 10%, then the hypotheses will be statistically significant with a reliability of 99%, 95%, respectively, and 90% (Figure 3).

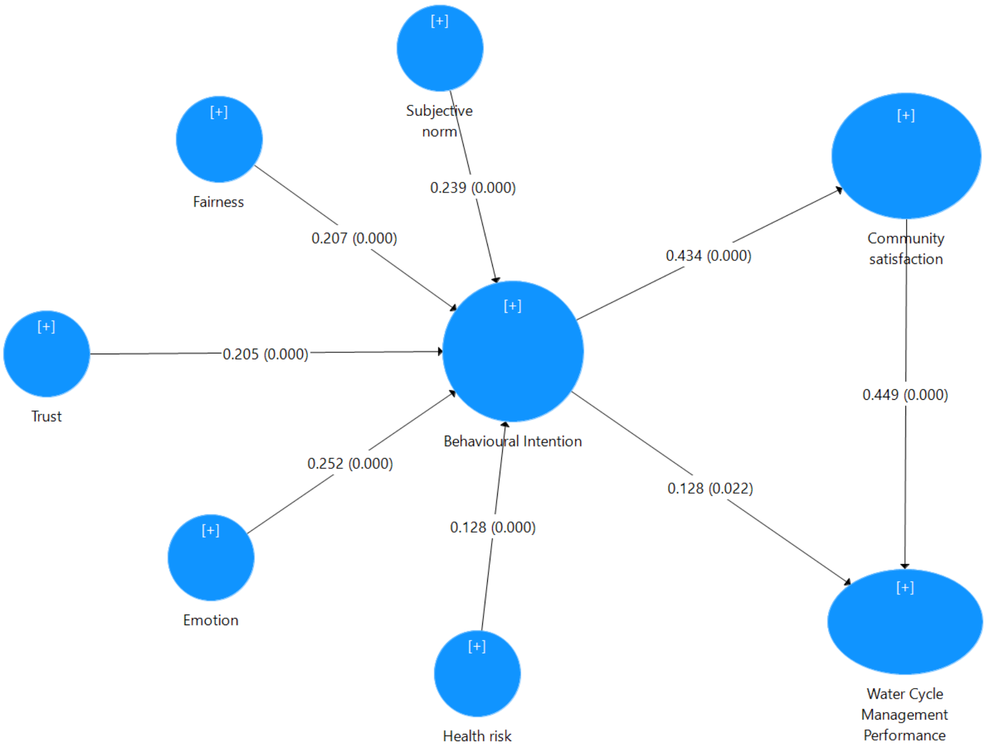

Figure 3. Bootstrapping results (SmartPLS output)

Figure 3 shows that the relationships between the concepts in the research model have positive effects. Specifically, the subjective norm positively impacts the Behavioral intention with an impact coefficient of 0.239 at the 1% level (P_value = 0.000).

Fairness has a positive impact on Behavioral intention with an impact coefficient of 0.207 at a significant level of 1% (P_value = 0.000).

Trust has a positive impact on Behavioral intention with an impact coefficient of 0.205 at a significant level of 1% (P_value = 0.000).

Emotion positively impacts behavioral intention with an impact coefficient of 0.252 at a significant level of 1% (P_value = 0.000).

Health risk has a positive impact on Behavioral intention with an impact coefficient of 0.128 at a significant level of 1% (P_value = 0.000).

Behavioral intention positively impacts water cycle management performance with an impact coefficient of 0.128 at a significance level of 5% (P_value = 0.022).

The behavioral intention had a positive impact on community satisfaction with an impact coefficient of 0.434 at a significance level of 1% (P_value = 0.000).

Community satisfaction positively affects water cycle management performance with an impact coefficient of 0.449 at a significant level of 1% (P_value = 0.000).

The summary of the research hypotheses is given in Table 6.

Table 6.
Path coefficients, mean, STDEV, T-values, P-values (SmartPLS output)

	Original Sample (O)	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P-Values**	**Hypothesis test results**
Behavioural Intention -> Community satisfaction	0.434	0.438	0.041	10.611	0.000	Supported
Behavioral Intention -> Water Cycle Management Performance	0.128	0.129	0.056	2.294	0.022	Supported
Community satisfaction -> Water Cycle Management Performance	0.449	0.452	0.048	9.323	0.000	Supported
Emotion -> Behavioural Intention	0.252	0.252	0.007	34.041	0.000	Supported
Continuation of Table 6						
Fairness -> Behavioural Intention	0.207	0.207	0.005	43.870	0.000	Supported
Health risk -> Behavioural Intention	0.128	0.128	0.007	17.366	0.000	Supported
Subjective norm -> Behavioural Intention	0.239	0.239	0.005	47.006	0.000	
Trust -> Behavioural Intention	0.205	0.206	0.005	41.595	0.000	Supported

Thus, all hypotheses are accepted.

V. CONCLUSION

A. General Conclusions

It can be seen that Vietnam is now a developing country with a GDP per capita of $ 6900 in 2017; comparing this figure with Tunisia, which is also a developed country with a GDP per capita of $ 12,000 in 2017, shows that Vietnam has a lower level of development than Tunisia. However, under the attention of the Government and the State according to the sustainable development strategy, it shows that the establishment of standards for wastewater reuse is extremely necessary.

Setting the criteria for the quality of reused water too high, such as in the US, Japan, Germany, is impossible for Vietnam today in terms of socio-economic, development level, and qualifications. However, we can achieve reused water quality indicators for other developing countries such as Tunisia and Oman.

The principles of integrated water resources management should be applied while developing a national strategy. The National Strategy should consider the principles of integrated water resources and river basin management to urban sanitation, to sustain the Government's commitment to improving conditions of sanitation, and bringing urban sanitation on the agenda. The Law on Environmental Protection 2005 and the Law on Water Resources 2012 are the basis for enacting legislation, coordination mechanisms in the urban sanitation sector, mobilizing service providers, and focusing on water quality control in river basins, and strengthening sector performance monitoring at the central level. This approach allows the integration of water supply, sanitation and sanitation components, improving coordination between public agencies, the private sector, and the community. Following that, the National Target Program on Urban Sanitation development will also ensure the sustainability of the results obtained from the above efforts and serve as a basis for determining priority orders. Invest, strengthen technical and institutional capacities, and set up an appropriate financial mechanism to mobilize and concentrate resources to meet those priorities.

Raising awareness of customers using environmental sanitation services. Just as the local government needs a tool to calculate the cost of sanitation services, service users need to be aware of the benefits that the service brings and be willing to pay the cost of the service. Sewerage and wastewater treatment projects should implement an Information - Education - Communication program to raise public awareness of sanitation issues in general and awareness of the benefits of sanitation. As a result, service users will actively participate in connecting indoor drainage pipes to the public drainage system, willing to pay service prices, thereby increasing revenue and improving revenue efficiency and cost recovery. Communication campaigns can also be used to communicate regulations on wastewater management, including topics such as septic tank design and construction, periodic sludge extraction, and sludge management.

To overcome the limitations, proactively prevent, prevent and reduce pollution, create a fundamental change in water resource management and environmental protection in 2020 and the following years, study giving urgent tasks and solutions, focusing on several key tasks.

Firstly, synthesize, propose amendments to regulations on environmental protection in laws on environment, natural resources, taxes, budget, investment, construction, science and technology, energy ensuring consistency, synchronization, meeting the requirements of the protection of the environment and water sources.

Second, focus on inspecting and examining objects with a wastewater flow of 200 m3 / day or more nationwide; review and assessment of environmental impacts, environmental protection works, and measures of large projects with a high risk of environmental pollution; General investigation, evaluation, and classification of waste sources nationwide; building a national database system on waste sources.

Third, build and implement the Scheme on a breakthrough mechanism to mobilize resources, attract investment, socialize and protect the environment, strictly comply with the principle: People who benefit from the environment have obligations to financial contributions to environmental protection; people causing environmental pollution, incidents and degradation must overcome and compensate for any damage.

Fourthly, to implement the collection of charges for granting water right to the exploitation of water resources in order to promote awareness and strengthen measures to use water more economically and effectively; It is also necessary to promote the implementation of preferential policies for economical water use activities, including incentives for in-depth investment to reuse wastewater and use circulating water.

Fifth, strengthen strict management of river basins, protect forests and aquatic resources. Strictly control activities that change flows, dredging canals, exploiting sand and gravel, causing landslides, adversely affecting the basin environment, affecting production and economy of the people. This situation has been observed in many localities across the country. We all know the recent complicated developments in the Cau River basin, the section flowing through Bac Ninh province. Ministries, branches, and localities need to strictly grasp the Prime Minister's recent directive on the strict management of activities to license dredging inland waterways.

Sixthly, to focus on investing in a monitoring system of water exploitation and wastewater discharge activities towards socialization of wastewater flow and quality monitoring. Thereby, wastewater discharge facilities, water extraction facilities will have to invest in installing automatic monitoring equipment, analyzing wastewater quality, and connecting to the general monitoring system. State investment creates a unified system between the central, local, and in each river basin.

Seventhly, to increase the propagation and dissemination of laws and information on water resources to people and enterprises; strengthening the protection of water resources; promote the investigation and planning of water resources; focus on inspection and examination; handle violations of the law on water resources.

Eighthly, strengthening international cooperation and implementing solutions to solve problems of exploitation and sustainable use of water resources of the Red River and the Mekong River with upstream countries.

Research shows that the development of quality standards for reused water in urban areas is essential. The main scientific basis of the development of reusable water quality is based on comparison with the standards of developing countries such as Tunisia, Oman in combination with existing wastewater quality standards. in Vietnam as QCVN 14: 2008 / BTNMT; QCVN 40: 2011 / BTNMT and QCVN 08: 2015 / BTNMT. The reused water quality standard proposed according to Table 3 can be used for the following applications in urban areas, such as watering plants, washing roads, water supply for fire fighting.

The research results in the article can be a reference to formally develop a quality standard of reused water for urban areas that contributes to the country's sustainable development.

B. Limitations and Future Research

The research sample includes community residents living in three big cities of Vietnam: Hanoi, Ho Chi Minh City, and Da Nang city. Because the study sample was the only representative in three cities, inevitably, the study population will not be representative. In addition, the research method is a survey method based on a questionnaire to assess individual perception. Therefore, the study may suffer from biases of the survey method.

In the future, new studies can evaluate based on secondary data to analyze the benefits and the impact of wastewater reuse policy on community satisfaction and the quality of citizen's life. In addition, future research may survey on a larger scale, surveying all provinces in Vietnam to ensure representativeness of the whole.

C. Contribution

The study uses behavioral theory to assess the intention to reuse wastewater for community satisfaction in the effective cycle of water resource management. According to the development trend of the world, at the same time, resources are limited, especially water resources. Therefore, the options for the reuse of domestic and industrial wastewater have been mentioned by many previous studies. However, there have been no studies assessing the impact of the intention to reuse wastewater on people's satisfaction and affecting the effectiveness of water resource management. This study assessed the impact of the intention to reuse wastewater on community satisfaction and water management efficiency. The test results from more than 1,000 households show that the intention to reuse wastewater positively impacts people's satisfaction and water management efficiency. At the same time, community satisfaction has a strong impact on the effectiveness of water management.

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