



# The synergy between the government and the society for sustainable sanitation

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## ABSTRACT

**Background:** Ensuring sufficient and enduring sanitation is crucial for the progress of the community, particularly in Ransiki, where obstacles exist in terms of public involvement and infrastructure. This study examines different strategies for enhancing the quality of housing and sanitation through partnerships between communities and local governments. The process comprises a comprehensive field survey and a thorough interview using a predetermined set of questions. **Methods:** The data analysis conducted using the Smart PLS approach revealed that the community-based sanitation system in Ransiki was unsuccessful in enhancing the quality of settlements. **Result:** The primary issue lies in the insufficient sanitary infrastructure and the lack of public sanitation awareness. Establishing sanitation in the courtyard and surrounding regions is the only way to enhance the quality of human resources and settlements. Public engagement in sanitation remains limited, primarily due to insufficient education. While local governments prioritize infrastructure development, such as waste management and TPA, they must broaden their focus to include other areas, such as sanitation education. Moreover, the study revealed that the quality of settlements is directly influenced by factors such as the home environment, household hygiene, and human resources. Enhanced human resources positively impact the use of clean and safe water. **Conclusion:** This study asserts that improved collaboration between community and government endeavors is vital. Enhancing sanitation in a successful and enduring manner necessitates heightened public consciousness and education regarding sanitation, as well as government policies that are receptive and proactive. This study offers valuable perspectives on constructing efficient and enduring sanitation initiatives in Ransiki and other locations facing comparable circumstances.

**KEYWORDS:** public participation; role of the regional government; sanitation infrastructure; sustainable sanitation; quality of residence

## 1. Introduction

Law of the Republic of Indonesia Number 1 of 2011 concerning Housing and Settlement Areas confirms that everyone has the right to live in physical and spiritual prosperity, to live in and to obtain a good and healthy living environment, which is a basic human need, and which has a very strategic role in shaping the character and personality of the nation as one of the efforts to build a complete, self-reliant, independent, and productive Indonesian human being. It is further emphasized that residential areas are part of the living environment outside protected areas, both in urban and rural areas, which serve as a residential environment and a place of activity for daily life.

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According to Fitriani, V. (2022), environmental sanitation is a way and effort of individuals or communities to monitor and control the external environment that harms health and can threaten human survival. Mahpolah et al. (2013) emphasized that efforts that can be made for the health of the physical environment include providing clean water, preventing air, water, and soil pollution, and breaking the chain of transmission of infectious diseases and others that can harm and cause pain in humans or society.

Sanitation is an effort to dispose of domestic liquid waste and garbage to ensure cleanliness and a healthy living environment at the household level and in residential areas. Sari, W. N., & Endang, L. (2020) divided sanitation into 3 (three) parts, namely: i) wastewater, ii) solid waste, and iii) tertiary drainage. Presidential Regulation No. 185/2014 on the Acceleration of Water Supply and Sanitation explains that sanitation is all efforts to realize conditions that meet health requirements through sanitation development. Sanitation development is an effort to improve the quality and expansion of household waste services, domestic wastewater, and environmental drainage treatment in an integrated and sustainable manner through improved planning, institutions, implementers, and supervision.

Along with the development of the new autonomous territories, there has been an increase in the number of settlements and an impact on the sanitation of the environment. Hence, sanitation development in the new Autonomous Territories is the primary concern. According to the 2010 Millennium Development Goals Achievement Report in Indonesia, access to adequate sanitation in urban areas is still at 69.51 percent of the target to be achieved in 2015, which is 76.82 percent, while access to appropriate sanitation is 33.96 percent in rural areas from the target of 55.55 percent (Bappenas, 2017). Some other references Research shows that about 17 percent of residents of urban slum areas do their massive pissing activity without using a hammer. The Bappenas report shows that as many as 70 million Indonesians still use wastewater because they lack adequate sanitation. The MDG targets that as much as 62 percent of Indonesian families should have access to sanitation by 2015.

According to the 2015-2019 National Medium-term Development Plan, access to drinking water and sanitation is targeted at 100 percent. This commitment aligns with the Sustainable Development Goals (SDGs) as a global sustainable goal. Sanitation is a national priority because it can considerably impact the nation's environment and productivity. The document of the South Manokwari Regency under the District Regulations of the District of South Manokwari No. 2 of 2017 in section 52 of section 1 states about the implementation of environmental treatment network systems focused on accommodation network, drinking water service, liquid waste treatment, drainage network, disaster evacuation lines, and public cemetery.

Based on the above description, to meet the Millennium Development Goals and improve the population's quality of life in South Manokwari, It is necessary to conduct an in-depth assessment of whether community-based sanitation has contributed to improving the quality of human resources such as education, health, and community income generation. To do so, it is necessary to conduct research on the Synergy Between The Government and The Society For Sustainable Sanitation in the Ransiki district of South Manokwari Regency.

## **2. Literature Review**

### *2.1 The role of the government in the provision of public goods*

Sanitation development is an effort to improve the quality and expansion of household services, household wastewater, and environmental drainage treatment in an integrated and sustainable manner through improved planning, institutional enforcement, and good

supervision. The government, as a policymaker, is one of the parties that determines the availability of decent sanitation in every residential area.

Sutrisno et al. (2021) stressed that public policy is whatever the government chooses to do or not do. It can be said that general wisdom is a strategic exploitation of the resources available to solve public problems. This public policy is a form of intervention continuously carried out by the government in the interests of groups in society so that they can survive and broadly participate in development. Subianto, A. (2020). explains that public policy is said to be what is neither done nor done by the government, which can be classified as decisions in which the government has the authority to use authoritative choices, including the decision to let something happen to overcome a public issue. According to Toda et al. (2020) and Yakthi et al. (2023), policy is a specific goal or series of actions produced by a government at a particular time concerning a subject or in response to a critical situation.

The provision of public goods or services is closely related to public services, and Bailah, B., & Pasla, B. N. (2021) explain the taxonomy of goods and services categorized based on two main criteria: the degree of exclusivity (whether a good or service can only be enjoyed by one person) and the degree of exhaustibility (whether the good or service is depleted after being used in an economic transaction), as follows:

1. Private Goods/Services include goods or services that are highly exclusive and indivisible. Examples are clothing or massage services, which can be purchased by several people but are no longer available to others after purchase.
2. Public Goods/Services are minimal and exclusive. Examples include neighborhood security and street lighting, which cannot be restricted and do not get depleted.
3. Public Utilities or Semi-Public Goods/Services have a high level of exclusivity but can still be accessed widely.
4. Common Pool Resources include goods or services with many limitations but are not exclusive. Examples are toll roads or bridges, which others can use after being used by someone but require a fee for each use. Natural resources, such as coral reefs, fish, or sea turtles, are reduced in number after use but are difficult to charge directly to the users.

## *2.2. The role of society in environmental management*

Housing and settlement maintenance are the activities of planning, development, exploitation, and control, including the development of institutions, funding, and financing systems, and the role of a coordinated and integrated community. Population settlements are parts of the living environment outside the protected area, both urban and rural areas, that function as a live environment or a residential environment and a place of activities supporting livelihoods.

A settlement is a living environment that covers issues of employment, economic structure, and a population that not only involves the extinction and spread of the population but also concerns the human qualities expected of future generations of Salipu et al. (2023) and Ramandey et al. (2023). The concept of Daxiadis settlement in Izzatusholekha, I. Z. (2021) explains that settlement is the arrangement of the area made by man and its purpose to strive to live more efficiently and better, giving a sense of happiness and security.

As described by Maharani (2021), the settlement of residence is a place or area where people gather and live together, building houses, roads, and so on for their benefit. Nur

(2022) explains that the settlement is a functionally organized residential area, an economic and physical spatial system equipped with environmental facilities, facilities in general, and social facilities as an integrated unity by cultivating resources and funds, managing the existing environment to support the survival of improved quality of human life, giving a sense of security, tranquility and pleasure, comfort and prosperity in harmony and balance to serve as a vessel that can serve personal life, family, community, nation and country.

Generally speaking, settlements are housing with all its contents and activities. Housing is a physical container, while settlement combines the physical houses, facilities, and facilities with their surroundings. According to Setiawan, T. et al. (2023), an environmentally conscious settlement is a settlement capable of accommodating and promoting the development process of life within it in a reasonable and balanced manner by combining economic, ecological, and social interests. In its implementation, there must be a balance of activity between its society and the use of natural and artificial resources. That balance can be achieved through the community's concern for its environment.

Settlements with environmental management standards have environmentally friendly household wastewater treatment (Rahma, 2020; Aguspriyanti, 2022). When reviewed from the defense of sanitation, it is a public health endeavor that focuses on mastering various environmental factors that affect health (Savitri et al., 2022).

### *2.3 Environmental sanitation management*

Sanitation is one of the mandatory affairs of the District/City Government as established in Act No. 32 of 2004, sections 13 and 14, on Regional Governance, and Government Regulation No. 38 of 2007 on the Division of Government Affairs between the Government, the Provincial Regional Government, and the Regional Government of the Districts. To implement sanitation development, district/city governments can use National Budget funds, provincial Budget, community/ enterprise world grants, foreign donors as alternative sources, and their own APBD.

Partelow S. et al. (2020) and Rigolon, A. & Gibson, S. (2021) outlined several non-governmental institutional roles in environmental sanitation, among others:

1. Corporate Social Responsibility (CSR) is a company's program that manifests social responsibility through activities. Regency/City and Provincial Governments can directly coordinate with corporate associations with CSR activities in their respective areas. To socialize and offer sanitation development programs and activities to CSR-implementing companies, Regency/City Governments can take the initiative to hold meetings/workshops equipped with SSK/MPS documents, especially the investment plan tables (programs, activities, and budgeting).
2. Public-private partnership (PPP) is a cooperative project for providing infrastructure through a Cooperation Agreement or granting a business license between the Minister/Head of Agency/Regional Head and a Business Entity. Public-private partnerships can be implemented based on the government's initiative (solicited) and the private sector (unsolicited).
3. Private companies or non-governmental institutions concerned with sanitation are other potential sources of funding that can be accessed in the area. These organizations, such as NGOs, hotels, restaurants, banks/financial institutions, universities, professional associations, etc., care about residential sanitation. Participation can be goods or budgets donated directly to the community/community groups or the

District/City government. The mechanism for obtaining this funding is offering programs/activities through meetings/workshops.

According to Presidential Regulation No. 185 of 2014 on Acceleration of the Provision of Drinking Water and Sanitation (PPAMS), sanitation is all efforts to ensure the realization of conditions that meet health requirements through sanitation development. Sanitation development is an effort to improve the quality and expand the service of household waste management, domestic wastewater, and environmental drainage treatment in an integrated and sustainable manner through the improvement of planning, institutional, implementation, and good supervision.

### 3. Methods

This study used mixed methods to more effectively explore several aspects of the question. Quantitative methods aim for objective measurement and hypothesis testing, while qualitative methods effectively understand context, subjective experiences, and processes. This research was conducted in Ransiki District, the capital of South Manokwari Regency, which has an area of 9.7% of the area of South Manokwari Regency, 2812.44 square km, and a population of up to 50.9% of the total population of 34,009 people with a total of 13 villages out of 57 villages.

The research population consists of everyone living in the Ransiki district. The random block sampling method was used to collect samples in 13 villages, each 5–10, based on the block's homogeneity. It produces a sample of 100 hp. Quantitative data in this study was obtained through interviews and direct observations of drinking water sources, physical quality of water, landfill ownership and floor types, ventilation, and garbage and wastewater issues in the yard. The research uses questionnaires, checklists, writing tools, and digital cameras.

The variable in this study consists of one dependent variable, namely the Residence Quality, and four independent variables because they have measurement indicators to explain the meaning of such variables, such as the following table:

Table 1. Indicator variable latent

No	Variable	Indicators	Item instrument
1	Residence Quality	1. Ability to fulfill needs 2. Free Diarrhea	1. KM 2. BD
2	Water Consumption	1. Drinking water sources 2. Physical quality of clean water	1. SAM 2. KFA
3	Home Environment	1. latrine. 2. floor house 3. Ventilation	1. JR 2. LR 3. VR
4	Homeyard Sanitation	1. Dumping 2. Drainage 3. Condition of the home page	1. TS 2. PAL 3. KHR
5	Human Resource Quality	1. Age 2. Education 3. Number of households	1. UM 2. PD 3. JT

Use the free variable and bound variable relations test to trace a significant relationship based on the characteristics of the data collected using the Partial Least Squares (PLS) approach. PLS can be used on any data scale (nominal, ordinal, interval, ratio) and more flexible assumption conditions to measure each indicator's relationship to its

construction. In addition, PLS can perform bootstrapping tests on structural models that are external models and internal models. The bootstrapping method is intended because the PLS's normality assumption is not problematic. In addition to the data normality, PLS does not require the minimum number of samples by doing the bootstrapping.

PLS is more of an exploration than a confirmation. Nevertheless, the primary purpose of the PLS is to explain the inter-constructive relationship and emphasize an understanding of the value of the relationship. In this case, the critical thing to note is the necessity of a theory that gives assumptions to describe models, variable selection, analysis approaches, and interpretation of results. In his description, there are two models of indicators, namely, the reflective indicator model and the formative indicator. Data analysis phases with SmatPLS version 2.0.M3 are as follows:

1. Designing a Structural Model (Inner Model). The internal or structural model describes the relationship between latent variables based on substantive theory. Structural model design: The relationship between latent variables is based on a problem formula or a research hypothesis.
2. The outer model defines how each indicator block relates to its latent variable. The design of the measurement model determines the indicator properties of the respective latency variables, whether reflective or formative, based on the operational definition of variables.
3. Convert Track Diagram to Equation System
  - a. The basic equation model of the Inner Model can be written as follows:
 
$$\eta_j = \beta_0 + \beta_j \eta + \Gamma \xi + \zeta$$

$$\eta_j = \sum_i \beta_{ji} \eta_i + \sum_i \gamma_{jb} \xi_b + \zeta_j$$
  - b. The basic equation model of the Outer Model can be written as follows:
 
$$X = \Lambda_x \xi + \epsilon_x \quad Y = \Lambda_y \eta + \epsilon_y$$
4. Estimates: Weight, Track Coefficient, and Loading. The parameter prediction method (estimation) in PLS is the minor square method (least square method). The calculation process is done by iteration, where iterations will stop if the convergent condition has been reached. Parameter assumptions within PLS include three things: a) Weight estimate used to calculate data of the latent variable; b) Path estimate that connects the late variable and the loading estimate between the latency variable and its indicator; c) Means and location parameters (regression constant values, intercepts) for indicators and late variables.
5. Goodness of Fit evaluation
 

The goodness of the Fit Model is measured using R2 latent variable dependency with the same interpretation as regression. Q2 predictive relevance for structural model measures how well the model produces the observation value and estimates its parameters.  $Q^2 = 1 - (1 - R1^2) (1 - R2^2) \dots (1 - Rp^2)$ . Magnitude has a value with a range of  $0 < Q^2 < 2$  on-track analysis (path analysis).
6. Hypothesis testing. Resampling Bootstrapping). Hypothesis testing ( $\beta$ ,  $\gamma$ , and  $\lambda$ ) is performed using the Bootstrap resampling method developed by Geisser & Stone. The test statistics used are t-statistics or t-tests. Applying the resampler method enables the validity of free distribution data, does not require a standard distribution assumption, and does not need large samples; a minimum sample of 30 is recommended.

Based on the theoretical relationship framework above, the latent variable relationship model is constructed as follows:

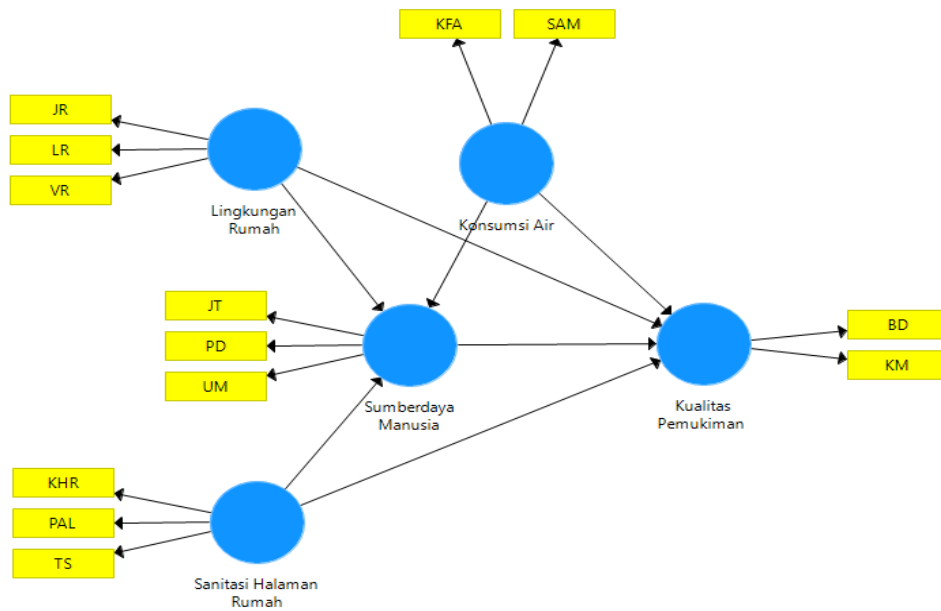


Fig 1. Research variable relationship

Based on the above relationship, hypotheses are built such as:

- H1: Water consumption significantly affects the quality of housing.
- H2: Residential environment significantly affects the quality of housing
- H3: Human resource quality significantly affects settlement quality
- H4: Sanitation of the yard substantially affects the quality of housing
- H5: Water consumption substantially affects the quality of human resources.
- H6: Residential environment significantly affects the quality of human capital
- H7: Home yard sanitation significantly affects the quality of human capital

#### 4. Result and Discussion

The results showed that respondents across the 13 villages generally lived in private homes (79 percent). In contrast, the remaining (21 percent) are non-private houses with an average number of rooms of 2-3 equipped with ventilation. The house floor is generally made of walls (98 percent). Drinking water and its quality comes from wells and visually meets health standards. Healthy sewer ownership is only 12 percent, while 88 percent still needs to be repaired so the wastewater has regular drainage. The house's condition is generalized up to 75 percent while the condition of 25 percent is purloined.

Respondents' ability to understand environmental sanitation is meager (4 percent), while those who understood less were 81 percent, and those who did not understand 15 percent. This condition has resulted in the treatment of environmental hygiene both inside and outside the severe homeless attention, which has caused 38 percent of respondents to be found susceptible to diarrhea in the last six months.

Habitat quality variables are based on indicators of the ability to understand and carry out environmental sanitation improvement actions and diarrhea-free, influenced by water consumption variables, household environment, household sanitation, and human resources. Water consumption variables consist of drinking water use and the physical

quality of clean water, and the home environment variable consists of landfill conditions, house floors, and house ventilation. In contrast, the householder sanitation variable consists of garbage and wastewater disposal, and the human resource variable comprises age, education, and number of dependents.

Results of data processing using a partial-least-square (PLS) based SEM approach by evaluating a Fit Model of a research model. Based on the assessment of the Outer Model or Measurement Model with Convergent Validity, Discriminant Validities, and Composite Reliability. The convergent validity of the measurement model with reflective indicators is assessed based on the correlation between the item score/component score estimated with Software PLS. Individual reflective sizes are considered high if correlated more than 0.70 with the measured construction, according to Shamin A. et al. (2017) and Syahputra A. et al. (2020). In the early stages of the study, the development of the scale of measuring loading values from 0.5 to 0.6 is considered sufficient Werimon S. et al. (2023).

This study uses a load factor limit of 0.50; each latent variable has indicators like in Table 3, which results as follows:

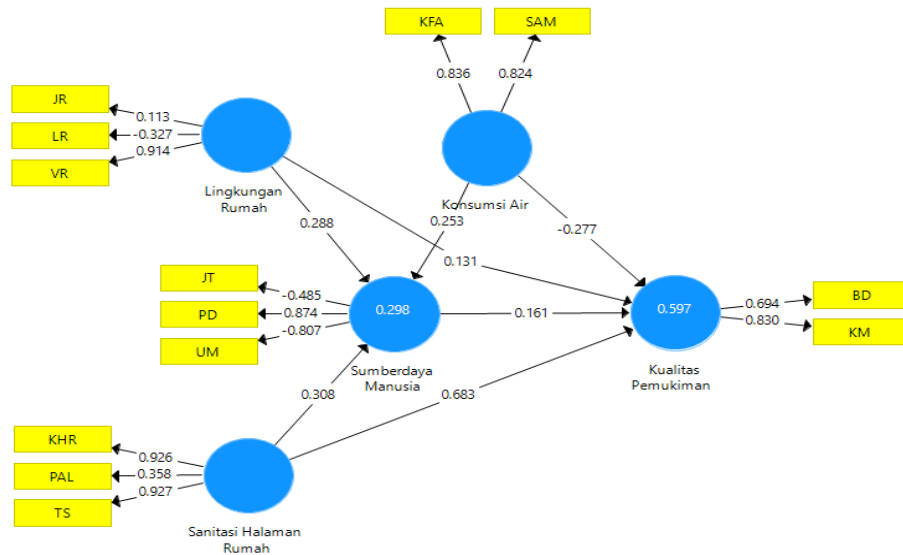


Fig 3. Estimate parameter (loading factor) conceptual model indicator versus latent variable

The outer values of the above model or the correlation between the constructions have not yet met convergence validity because four indicators still have a load factor value below 0.50. Modification of the model is done by removing indicators that have a loading factor value under 0.50, so the result is as follows:



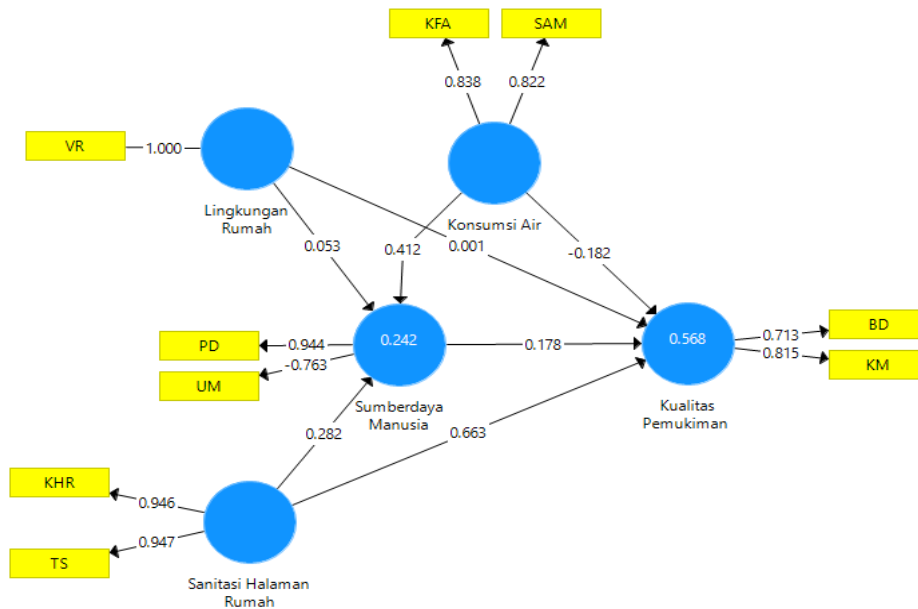


Fig 4. Model estimate parameter (loading factor) indicator against latent variable.

The hypothesis testing results of the model built above are as follows:

Hypothesis 1: Water consumption has a significant impact on settlement quality. The diagram depicts that Water Consumption (WEC) has an indirect influence on Settlement Quality (KPM) via Human Resources (HR), with path coefficients of -0.182 and 0.568, respectively.

H2: The housing environment has a substantial impact on housing quality. This hypothesis is supported by the path coefficient 0.412 between Home Environment (LR) and Housing Quality (KPM).

H3: Human resource quality has a substantial impact on settlement quality. Human Resources (HR) has a considerable direct influence on Housing Quality (KPM), with a path coefficient of 0.568, strongly supporting this theory.

H4: Home yard sanitation has a significant impact on settlement quality. Home yard sanitation (SHR) has a direct impact on Human Resources (HR), with a path coefficient of 0.228, and an indirect effect on Settlement Quality (KPM) via HR.

H5: Water use has a substantial impact on human resources. Water Consumption (WEC) has a negative path coefficient (-0.182) on Human Capital (HR), showing a significant but negative effect.

H6: The home environment has a substantial impact on human capital. The figure reveals no apparent connection between the Residential Environment (LR) and Human Capital (HR), implying that the structural model presented does not support this notion.

H7: Home yard sanitation substantially impacts the quality of human capital. This argument is supported by the fact that the Sanitation Home Page (SHR) has a path coefficient of 0.228 and directly influences Human Capital (HR).

The modified model mentioned above indicates that all loading factors have values above 0.50. Therefore, referring to these loading factors, the indicators of each latent variable in the estimation model Figure 4 are significant. The coefficient of determination for the Quality of Settlements variable is 0.568, indicating that human resources, yard sanitation, home environment, and water consumption variables can explain 56.8 percent

of the variation in the Quality of Settlements variable. At the same time, the remaining 43.2 percent is influenced by other variables not included in this research model. The coefficient of determination for the Human Resources variable is 0.242, indicating that this mediating variable can be explained by 24.2 percent by the variables of Home Yard Sanitation, Home Environment, and Water Consumption. In contrast, the remaining 75.8 percent is explained by other factors not present in this research model.

The path coefficient of each latent variable to the settlement quality indicates that the Home Yard Sanitation variable has a passage coefficient of 0.66, the Human Resource variables have a sidebar coefficient of 0.17, and the Home Environment variable has an officer of 0,0005. In contrast, the Water Consumption Variable imitates a coefficient of -0.18. The size of the path coefficients indicates that the quality of sanitation on the home page is greatly influenced by increased settlement quality, more so than other factors. The Indicators of Trash Can Arrangement and House Yard Conditions will play a prominent role in enhancing the Quality of Population Settlements in Ransiki District.

The variables related to water consumption, including water consumption indicators and the physical quality of clean water, do not directly impact the Quality of Habitat. However, they significantly influence Human Resources, with a path coefficient 0.41. On the other hand, the Home Page Sanitation score is 0.28, while the Home Environment score is 0.05. Human resources will be assessed based on age, education, and number of dependents, provided water consumption circumstances and physical quality satisfy the established criteria.

The yard's cleanliness and overall home environment directly impact the settlement's quality. Nevertheless, the extent of their impact remains limited, as both the quality of human capital and settlement quality still fall short of 70%. This implies that, despite attempts to enhance sanitation, the successful execution of effective sanitation procedures has not been widely accomplished. This may be attributed to insufficient infrastructure, limited knowledge, or inadequate education emphasizing the significance of proper sanitation.

The impact of human resources on settlement quality is substantial, indicating that enhancing the quality of human life can significantly improve settlement circumstances. This suggests a positive relationship exists between individuals' education, health, and well-being and the overall quality of the environment.

The quality of settlement is indirectly influenced by water use, with the quality of human capital acting as a mediator. This signifies that the presence of clean water and the availability of safe water are crucial components in enhancing the overall standard of living. However, their positive impact on communities can only be maximized entirely when accompanied by advancements in human capital.

The extent of community involvement in obtaining and executing sanitary infrastructure remains restricted. This could be attributed to a deficiency of awareness or comprehension regarding the significance of cleanliness, which is frequently associated with levels of education. Enhancing community engagement through educational initiatives and awareness campaigns may be crucial in alleviating this situation.

Municipal authorities play a crucial role in enhancing the availability of sanitation facilities, a goal that has not been completely realized. Although there are standards regarding the supply of sanitation facilities, the accomplishments still fall short of the desired goals. This suggests a need for more efficient approaches to implementing policies and providing sanitation facilities.

Environmentally sound settlements, as described by Hadi (2005), can accommodate and encourage life development in a reasonable and balanced manner by integrating economic, ecological, and social interests. The availability of clean water is a basic need of the community to be used in daily activities for drinking water, washing, bathing, baking, and other purposes. South Manokwari Regency has a clean water supply system that comes from shallow groundwater with good quality and is suitable for drinking.

## 5. Conclusion

From the previously mentioned data analysis and conversations, certain conclusions can be inferred, including that the insufficient maintenance of yards and residential environments directly impacts the quality of human resources and settlements. Still, this impact has not reached its maximum potential. Efforts should be made to enhance the configuration of sanitation systems and optimize air circulation in households to maximize their beneficial effects on the quality of settlements, particularly in Ransiki District.

The lack of sufficient knowledge and comprehension of environmental sanitation has resulted in low community engagement in sanitation efforts. Enhancing education and community engagement can bolster the successful implementation of sanitation measures and improve the overall quality of settlements.

Local governments must enhance the delivery and availability of sanitation infrastructure, including landfills, treatment plants, and upgraded drainage systems while promoting trash recycling. This will provide more extensive and enduring enhancements in the quality of settlements.

The quality of settlements is directly influenced by the housing environment, sanitation, and human resources, although water use has indirect effects. The human capital component serves as an intermediary in this connection, indicating the significance of raising the quality of human life as a crucial element in improving settlement quality.

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## Author Contribution

Conceptualization, R.N.W. and W.R.; methodology, W.R, I.S, and R.N.W.; software, R.N.W., and I.S.; validation, R.N.W.; formal analysis, W.R, and I.S.; investigations, I.S, W.R, R.N.W.; data curation, W. R.; writing-original drafting, R.N.W and W.R; writing-reviewing and editing, R.N.W and W.R; visualization, I.S and W.R.; supervision, I.S. and R.N.W.; funding acquisition, W.R.

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Not applicable.

## Informed Consent Statement

Not applicable.

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Not applicable.

## Conflicts of Interest

The authors declare no conflict of interest.

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