

July 2023

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Recommended Citation

Dwiputri, Vica Asrianti and Dewi, Ova Candra (2023) "Analysis of The Main Factor In The Implementation of Open Defecation Free Using The AHP Method," *Smart City*: Vol. 2: Iss. 2, Article 5.

DOI: <http://doi.org/10.56940/sc.v2.i2.5>

Available at: <https://scholarhub.ui.ac.id/smartcity/vol2/iss2/5>

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ANALYSIS OF THE MAIN FACTOR IN THE IMPLEMENTATION OF OPEN DEFECATION FREE USING THE AHP METHOD

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ABSTRACT

Environmental sanitation refers to an environment's health status, including housing, sewage disposal, clean water supply, waste management, and other factors. Sustainable Development Goals 6 (SDG 6) ensures people access proper environmental sanitation. Based on the monitoring and evaluation results of Community-Based Total Sanitation (STBM) in 2022, it was found that 100% of open defecation had been stopped for Pillar 1 of STBM. This study aims to identify the factors that influence the success of implementing Open Defecation Free (ODF) programs in Depok City. There are two stages in this study to determine the priority factors that influence the success of the Implementation of Open Defecation Free in Depok City using the AHP method. The first stage is identifying the factor, which is based on previous literature that has been done, as these factors are considered to have a significant influence and role in the success of program implementation. This study's factors were related to the contextual, psychosocial, and technological aspects, and The second stage involves data collection through a questionnaire distributed to 35 respondents who were analyzed using the AHP method. The results of this study are the main influential factors, such as personal background, knowledge of the importance of community sanitation, and ownership/maintenance of physical products, can lead to the effective implementation of ODF programs. However, it is essential to note that the success of ODF programs may vary depending on the specific context in which they are implemented. Thus a tailored approach may be necessary.

Keywords: *Environmental sanitation, Factor, Program, Open Defecation Free*

INTRODUCTION

In 2021, the population of Depok City was 2,085,935, with a population growth rate of 1.92% per year. This growth rate is significantly higher than the average population growth rate of 1.48% per year for West Java (BPS, 2022). The high population growth has substantial implications for the environmental sustainability and balance in the area. (Hidayati & Lestari, 2018)

Environmental sanitation refers to the condition of environmental health, which encompasses various aspects such as housing, sewage disposal, clean water supply, and other related factors. (S Notoatmodjo, 2002). In Depok City, the percentage of families with access to adequate sanitation facilities, such as healthy latrines, was 84.2% in 2017, 87.93% in 2018, 88.27% in 2019, and 91.99% in 2020 (Dinkes Depok, 2021). According to the monitoring and evaluation findings of *Sanitasi Total Berbasis Masyarakat (STBM)* in 2022, it was discovered that open defecation had been eradicated, reaching 100% under pillar one of the STBM program. (Bappeda Depok, 2022).

The Government of Indonesia has taken significant steps to meet the sanitation needs of the country's population and achieve the Sustainable Development Goals (TPA/SDGs), particularly Goals 6, which pertains to access to proper water and sanitation. The National Medium Term Development Plan (RPJMN) 2020-2024 outlines national policies and strategies that aim to provide universal access to sanitation, including attaining 100% access to clean drinking water and eliminating slum areas, and the provision of 100% access to proper sanitation. (Bappenas, 2020). To realize the universal target for sanitation, the Ministry of Health and several other ministries and partners launched the Community-Based Total Sanitation (STBM) approach in 2008 (Suryani et al., 2020).

The government of Depok City considers fulfilling the community's need for sound environmental sanitation a top priority, which is also a strategic issue addressed in the Regional Medium-Term Development Plan for 2021-2026 (Pemkot Depok, 2021). The implementation of STBM in Depok City has been running since 2012, and in 2019 the Depok City government issued *Peraturan Wali Kota Depok Nomor 64 Tahun 2019 Tentang Penyelenggaraan Sanitasi Total Berbasis Masyarakat* (Resign, 2021).

Based on previous research, three prominent aspects can be used to determine a influence on environmental sanitation improvement behavior: contextual, psychosocial, and technological. The contextual aspect is related to external factors beyond the scope of program interventions. This factor plays a crucial role in household decision-making regarding the adoption of a program (Jenkins MW, 2007). In this study, three factors are included in the Contextual aspect: Policy factors, such as government intervention, the existence of policy documents, and others. In the Resource Access Factors, these factors primarily focus on ensuring access to clean water and maintaining appropriate water conditions. Additionally, individual backgrounds Factors, including economic and educational conditions, also contribute to this aspect. (Figuroa ME, 2010). In this study, four psychosocial aspects are included: shared values, collective efficacy, social integration, knowledge of shame and disgust, knowledge of the importance of environmental sanitation, and community initiatives. Aspects of technology are factors that provide convenience for users in applying behavior changes in their environment (Katukiza AY, 2010). This aspect includes three factors: ownership and maintenance of the physical product, knowledge of its use, and access to purchase locations.

Based on the explanation above, this study aims to identify the factors influencing success in implementing Open Defecation Free in Depok City by analyzing data using the Analytical Hierarchy Process (AHP) method.

METHODS

Multi-criteria analysis (MCA) is a set of methods commonly used in decision-making systems to compare various factors and determine the optimal solution (Massam, 1988) The application of the MCA method is highly recommended in learning environments. Among the various MCA methods available, the Analytic Hierarchy Process (AHP) is the most frequently used method for assessing factors (Ridder, 2004).

There are two stages in this study to determine the priority factors that influence the success of the Implementation of Open Defecation Free in Depok City using the AHP method. The first stage is identifying the factor, which is based on previous literature that has been done, as these factors are considered to have a significant influence and role in the success of program implementation. This study's factors were related to the contextual, psychosocial, and technological aspects.

Table 1. Table of Factor Determination

No	Aspect	Factors	Brief description	Source
1	Contextual Aspect	Policy factors	Policy factors include regulatory documents such as environmental sanitation standards, water and waste management and monitoring of water and waste quality), planning documents such as RPJMD and City Strategic Plans, and governance.	(Woode et al., 2018), (Afework et al., 2022), (Nandita et al., 2019), (Ashari et al., 2016), (Fatonah, 2015)
2		Resource access factors	Access to resources here includes access to clean water resources	(Sesay et al., 2022)
3		Individual background	In this study, the term individual background refers to factors such as the level of education, economic status, income, employment, and existing habits of the community.	(Woyessa et al., 2022), (Fatonah, 2015; Jamdade et al., 2017), (Fatonah, N,2015)
4	Psychosocial Aspect	Shared values, collective efficacy, social integration	This is related to the level of behavior that must and cannot be done in everyday life in the social environment. If you violate it, you will generally receive sanctions from the environment.	(Fatonah, 2015)

No	Aspect	Factors	Brief description	Source
5		Knowledge of shame and disgust	This understanding is associated with emotions of embarrassment and repulsion resulting from an individual's practice of open defecation in an inappropriate location lacking proper facilities.	(Arfiah, n.d.)
6		Knowledge of the importance of environmental sanitation	This knowledge relates to people's understanding that a dirty environment has negative impacts, such as polluting the surroundings, increasing the risk of disease transmission, and creating unpleasant odors.	(Woyessa et al., 2022), (Nandita et al., 2019)
7		Community initiatives	Community initiatives related to actions taken by community groups to create positive changes in their environment, such as maintaining facilities and promoting programs related to environmental sanitation	(Jamdade et al., 2017), (Ashari et al., 2016)
8	Technological Aspect	The ownership and maintenance of the physical product	Product ownership can certainly influence people's willingness to adopt the program, and good product maintenance can extend the product's life and increase the user's comfort.	(Sesay et al., 2022)
9		Knowledge related to the physical use of the product	Understanding how to use the product is crucial in ensuring safety and preventing any unintended damage	(Afework et al., 2022), (Sesay et al., 2022)
10		Access to where to buy the product	Purchasing products that suit one's needs and budget is a good first step toward product	(Arfiah, n.d.), (Ashari et al.,

No	Aspect	Factors	Brief description	Source
			ownership, and convenience of purchase is certainly a key factor	2016) (Woyessa et al., 2022)

The second stage involves data collection through a questionnaire distributed to 35 respondents representing the government, health centers, community organizers, and beneficiaries in Depok City, with a proportionate distribution. The questionnaire includes factors that were previously identified in each aspect. (Saaty, 1993) The factors will be developed into a pairwise comparison matrix, where each factor will be ranked in pairs based on their relative importance using a scale of nine ratings. The matrix is shown below:

Table 2. Table pairwise comparison matrix scale

Interest intensity	Information
1	Both factors are equally important
3	One factor is slightly more important than the other factor
5	One factor is more important than the other factor
7	One factor is clearly more important than the other factor
9	One factor is absolutely more important than the other factor
2,4,6,8	Values between two adjacent judgment values

Source: Thomas.L. Saaty, 1993

In this study, comparisons were made based on the level of importance of each factor, which was determined through pairwise comparisons using a scale of 9 ratings. Each factor was compared against other factors to form a matrix. After obtaining the pairwise comparison, each factor was calculated using the AHP method. The eigenvector was then used to determine the priority weight of each criterion for the goal. These priority factors were expected to identify the most influential factors in the success of implementing Open Defecation Free in Depok City. Inconsistencies in pairwise comparisons often occur due to the subjectivity of the respondents' perceptions. Therefore, the AHP method assessed pairwise consistency by calculating the (Consistency Ratio) CR. If the CR value is less than or equal to 10% (0.1), the score is considered consistent, indicating that the respondents' results in this AHP calculation provide a correct assessment.

RESULTS AND DISCUSSION

Contextual Aspect

Factors in the contextual aspect are factors related to the context outside the scope of the influence of program interventions, commonly referred to as existing conditions that will influence an individual's decision to join the program. The results of the geometric mean calculations, priority vector weight assessments, and their consistency ratios (CRs) from pairwise comparisons of the three factors in the contextual aspect, namely policy, access to resources, and individual background of the respondents, can be seen in Table 3 below:

Table 3. The Result of Contextual Aspect of AHP

	(P1.01.01) Policy factors	(P1.01.02) Resource access factors	(P1.01.03) Individual background	Priority Vector weights
(P1.01.01) Policy factors	1.000	1.401	0.412	0.272
(P1.01.02) Resource access factors	0.714	1.000	0.876	0.279
(P1.01.03) Individual background	2.429	1.142	1.000	0.449
Jumlah	4.142	3.543	2.288	1.000
Principal Eigen Value				3.040
Consistency Index (CI)				0.020
Consistency Ratio (CR)				0.035

Based on the results of AHP calculations on the contextual aspect, a consistency ratio value of 0.035 was obtained, indicating that the comparison between factors in the contextual aspect is consistent. Therefore, a decision can be made based on the weight of the priority vector (PV). The PV weight shows that the individual background factor has the highest weight, equal to 0.449.

This individual background is defined as the relationship between education, income, and employment of the people affected by the open defecation-free program intervention. (Widowati, 2015). When people have a good education and financial stability, they are more likely to adopt the programs that will be implemented in the future. (Jenkins MW, 2007). The individual background factor is considered to have the greatest influence on the success of implementing Free Open Defecation in Depok City.

Psychosocial Aspect

Psychosocial aspects are the determinants of behavior change when program interventions are carried out. The results of the geometric mean calculations, priority vector weight assessment, and consistency ratio (CR) obtained from pairwise comparisons on the four factors in the psychosocial aspect, namely shared values and norms, knowledge of shame and disgust, knowledge of the importance of community sanitation, and community initiatives from respondents, are presented in table 4 below:

Table 4. The Result of Psychosocial Aspect of AHP

	(P1.02.01) Shared values, collective efficacy, social integration	(P1.02.02) Knowledge of shame and disgust	(P1.02.03) Knowledge of the importance of environmental sanitation	(P1.02.04) Community initiatives	Priority Vector weights
(P1.02.01) Shared values, collective efficacy, social integration	1.000	1.186	0.338	0.330	0.134
(P1.02.02) Knowledge of shame and disgust	0.843	1.000	0.356	0.460	0.135
(P1.02.03) Knowledge of the importance of environmental sanitation	2.958	2.813	1.000	1.316	0.400
(P1.02.04) Community initiatives	3.034	2.174	0.760	1.000	0.331
Jumlah	7.835	7.173	2.453	3.106	1.000
Principal Eigen Value					4.025
Consistency Index (CI)					0.008
Consistency Ratio (CR)					0.009

Based on the results of AHP calculations on the psychosocial aspect, a Consistency Ratio value of 0.009 was obtained, indicating consistency among the factors in the psychosocial aspect. Therefore, a decision can be made based on the weight of the priority vector (PV). The knowledge factor regarding the importance of community sanitation has the highest weight of 0.400. Thus,

the knowledge factor on the importance of community sanitation is an influential factor in the success of implementing the Open Defecation Free program in Depok City.

In previous studies, it was explained that the importance of community knowledge regarding environmental sanitation greatly influences the willingness of the community to change open-defecation behavior. Therefore the role of counseling is one of the important methods in implementing open defecation-free programs. (Widowati, 2015).

Technological Aspect

The technological aspect refers to the factors that support user convenience in applying behavior change in their environment. The easier for someone to access these factors, the easier it will be for someone to change their behavior. The results of the average geometric calculations, priority vector weight assessments, and consistency ratio (CR) from the pairwise comparisons on the three factors in the technological aspect, namely ownership and maintenance of the physical product, knowledge related to the physical use of the product, and access to product purchases from the respondents, can be found in table 5 below.

Table 1. The Result of Technological Aspect of AHP

	(P1.03.01) The ownership and maintenance of the physical product	(P1.03.02) Knowledge related to the physical use of the product	(P1.03.03) Access to where to buy the product	Priority Vector weights
(P1.03.01) The ownership and maintenance of the physical product	1.000	2.374	2.641	0.534
(P1.03.02) Knowledge related to the physical use of the product	0.421	1.000	2.811	0.313
(P1.03.03) Access to where to buy the product	0.379	0.356	1.000	0.154
Jumlah	1.800	3.730	6.451	1.000
Principal Eigen Value				3.097
Consistency Index (CI)				0.048
Consistency Ratio (CR)				0.084

Based on the results of the AHP calculations on the technological aspect, a Consistency Ratio value of 0.084 was obtained, indicating that the comparison between factors in the technological aspect is consistent. Therefore, a decision can be made based on the weight of the priority vector (PV). In this weight, it can be observed that the factor of ownership and maintenance of the physical product has the highest weight, equal to 0.534. The ownership and maintenance factor of the physical product is a factor that influences the success of implementing Open Defecation Free in Depok City. This also aligns with the Environmental Points Sustainable Development Goals (SDGs) target, which aims to ensure people have healthy latrines and achieve open defecation-free status by 2030 while maintaining cleanliness and sanitation. (WHO, 2018).

CONCLUSION

The factors influencing the success of implementing Open Defecation Free in Depok City can significantly assist the government and related stakeholders in selecting processes or future improvements. This study is in line with previous research, which concluded that three main aspects are important to note for success in implementing Open Defecation Free in Depok City: contextual aspects, psychosocial aspects, and technological aspects. However, after further identification in this study, new findings have emerged, where the main factors are found from

each aspect. The most influential factor in the contextual aspect is unique background, in the psychosocial aspect is knowledge of the importance of community sanitation, and in the technological aspect is ownership and maintenance of the physical product.

Related agencies are suggested to conduct the extension program for open defecation-free implementation routinely and equitably, particularly in regions with different individual backgrounds from the majority. This aims to increase the community's knowledge and attitudes toward the program and promote better participation and sensitivity in the future. Additionally, it is hoped that the community can be more active and take the initiative to continue participating in intervention activities and ensure proper maintenance of the government-provided facilities. For future researchers, it is recommended to conduct further studies in different areas and expand the factors to be identified for a more comprehensive understanding of the implementation of open defecation-free program.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. Satoshi Kojima, Program Director Kansai Researcher Center, IGES Japan, for his insightful comments. We also thank all the respondents for their active participation.

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