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Mediating Effect of Attitude on Participation in Solid Waste Management

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Abstract:
Background:Domestic solid waste management (DSWM) is one of the major issues in both developed and developing countries. The situation is even worse in African countries including Tanzania as the majority of its people are residing in an unplanned settlement where, management of solid waste is very difficult. The efficiency management of DSWM requires an effective participation from various stakeholders, especially the local people, who are fully aware of and have a positive attitude as well as good perception regarding DSWM issues. Meanwhile, radio has a wide coverage in Tanzania. It should be an important medium for raising public awareness about DSWM as to easily influence them to effectively participate in the management activities. The objective of this paper is to analyze the relationship between awareness, perception, attitude, and participation in DSWM in Dar es Salaam city, and to test the mediating effect of attitude on the relationship between awareness and perception on participation in DSWM. The study was guided with development communication theory (DevCom-theory) in promoting DSWM issues through the radio programme.
Materials and Methods: A total of 392 respondents from Temeke Municipality participated in this study, which employed a quantitative research design using the survey method with questionnaire as its instrument for data collection.
Results: The findings revealed a positive relationship among all variables. Attitude fully mediate the relationship between awareness and participation in DSWM. In addition, attitude was able to partially mediate the relationship between perception and participation.
Conclusion: The households' awareness, perception and attitude do affect participation in DSWM. It is also proven that attitude is a powerful construct in mediating the relationship between the tested variables.
Key Word:Attitude; Dar es Salaam; development communication theory; DSWM participation; radio usage

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I. Introduction

Domestic Solid Waste (DSW) is trash or garbage produced from household daily activities including food preparation, cleaning, fuel burning, old clothes and furniture, obsolete utensils and equipment, packaging, newsprint, and garden wastes[1]. Its appropriate management comprises several processes such as sorting, collecting, transferring, treating, and disposing of all unwanted products from the households[2].

The study focuses on DSW issue due to the serious challenges of effective management of DSW that Tanzania cities are facing including Dar es Salaam. The issue is becoming more serious not only in Tanzania but in all developing countries. This is owing to the fact that many countries have insufficient budget, lack of advanced technology and lack of practical ideas on how well they can manage negative environmental implications[3]. At the same time, low level of public awareness on environmental issues is one of the main factors contributing to poor DSWM in many of developing countries[4].

In Tanzania, existing literature affirmed the major factors that contribute to poor management of DSW is due to urbanization, poor infrastructure, low level of public awareness on DSW and poverty[5,6,7]. These factors contributed much to the creation of illegal dumping sites, low knowledge, poor skills, and instruments relating to DSWM in most of the Tanzania cities. Thus, the collection of these problems poses some risks to humans' health, economic and environmental impacts.

In spite of several efforts taken by the government on reducing the problem such as awareness campaigns, seminars and workshops to educate street leaders, and small entrepreneurs[8], DSWM continues to be a challenge in Dar es Salaam. This is because the public has no sufficient knowledge on how to manage solid

waste effectively[3], they are not aware on its impact while some others refuse to pay waste collection fees by thinking that is the government's responsibility and not them[3,6]. There are also those who are not happy with the quality of the DSWM services as characterized with irregularity and inefficient collection system[9,10].

The study assumes mass media, mainly radio has a powerful contribution on promoting households' participation in effective DSWM, as it has a great role of educating and raising public awareness regarding DSWM issues in Dar es Salaam city. Radio was chosen because it is the cheapest, quickest and has the widest coverage compared to other mass media. As reported by[11] that more than 90 percent of the Tanzania population listen to radio. Therefore, the studyaimed at examining the relationship between factors influencing participation in DSWM among households' radio listeners in Dar es Salaam, Tanzania. The two primary objectives that this study addresses include: to analyze the relationship between awareness, perception, attitude, and participation in DSWM in Dar es Salaam city; and to test the mediating effect of attitude on the relationship between awareness and perception on participation in DSWM.

Theoretical framework

This study is guided with development communication theory (DevCom-theory) which was introduced by Dennis McQuail in 1987. The theory states that mass media has a great contribution for bringing national development in third world countries[12] as it has an obligation to report relevant development programmes and assisthe government in the implementation of policies[13,14].

When the authority struggles to bring changes, mass media including radio have the roles of raising awareness, educating the public for change, and influencing audiences' attitudes in causing behavioral change towards development[15].

In the context of the study, effective management of DSW resulting from a positive contribution of radio, as it assists the government on policy making and reportingon waste management issues. This study assumes media, specifically radio, must play its role well and helps disseminate information regarding DSWM. This theory helps to view the role of radio in developing countries on the issue of DSWM as one of the developmental challenges in many cities including Dar es Salaam. Therefore, this study employed the DevComm-theory to examine the effectiveness of promoting DSWM information through the radio platform in Tanzania.

Participation in DSWM

Participation is defined "as a process, through which stakeholders influence and share control over development initiatives, decisions and resources which affect them" [16].In waste management field, participation is the process that involves numerous stakeholders such as households, municipal authorities, media, and other affiliated institutions[17]. However, serious effort from the media is very crucial to integrate the stakeholders' interest, including households in understanding their roles, relationships and contributions in achieving effective management of the issues[18]. Previous studies including[19] reported that household's participation on DSWM issues can significantly reduce the amount of waste and the cost of collection. In Tanzania, household participation in DSWM continues to be a challenge due to the lack of awareness of proper ways in storing, collecting, and separating waste products. As reported by[20] that most households use improper dustbins and old sacks to store their housewaste. Thus, this study is looking for the relationship between factors influencing participation in DSWM such as awareness, perception, and attitude among radio listeners in Dar es Salaam city.

Awareness on DSWM

Awareness is an individual's understanding or knowledge on certain issues. As for this study, itis about DSWM.Some literatures revealed thathouseholds' participation in DSWM activities highly depends on several factors including their level of awareness[21,22]. Effective participation result from a higher level of individual awareness about the problems related with solid waste, such as waste burning and burying, open dumping and its consequence.Thus, theprovision of waste management education for the local people would help them to be aware of management issues as well as its positive implications of waste management activities[23]. Nonetheless, thesuccess of awareness campaigns on solid waste management requires much participation from media as to ensure that people become more familiar on how they can effectively collect, sort, transfer and dispose their household solid waste[24].

Similar to other countries, the Tanzania's government and other affiliated institutions are engaged in awareness campaigns to raise the level of community awareness on DSWM to influence full participation in DSWM[25,26]. They found that the high level of awareness on solid waste management issues enhances participation in DSWM[27]. This is due to the fact that effective management of DSW goes along with awareness of the community towards the issues. As such, community awareness is more essential to increase their proper participation in DSWM[28]. Based on the discussions above, the level of awareness on solid waste management helps in influencing people to fully participate in DSWM activities. Therefore, this study postulates that:

H1Awareness is positively correlated with participation in DSWM.

Perception on DSWM

Perception is concerned with an individual's thoughts, beliefs or views towards a certain issue, event, product, services, or action. Perception is one of the main factors that influence households to participation in management issues[29]. In DSWM, recognizing individuals' perception towards the issue is very crucial as it contributes to effective and appropriate plans of waste management strategies[30]. As reported by[31] that when individuals perceive the DSWM activities as an easy task, they are more motivated to participate. This means their participation depend much on their thoughts on how difficult DSWM activities can be, i.e., collecting, separating, storing, transporting (from the house to collection point) as well as paying waste collection fee.

This was also supported by[32,33]that people would be more likely motivated to participate if they have a positive perception towards solid waste management issues. The positive thoughts can be derived from better understanding about the environmental issues. The relationship found between perception and participation in DSWM is positive as supported by previous scholars[32,34,35]. Based on the above literature, the following hypothesis is posited:

H2 Perception is positively correlated with participation in DSWM.

Attitude towards DSWM

Attitude is an individual's feelings of likes or dislikes, favorable or unfavorable towards something or someone. An individual attitude can be positive or negative, all these situation tend to affect his/her participation in the particular issue[29]. For this study, a positive attitude may influence participation which leads to efficiency in DSWM, while negative attitudes may be a source of waste management problems[32]. Changing people from negative attitude requires much support from the media. As reported by[36], the mass media do not only raising public awareness about waste management but also changing people's attitude, which in turn helps to influence their participation for achieving better health.

The household's attitude can also be motivated and changed by a lack of credibility and poor thoughts on decision making, processes, and controlling mechanisms for solid waste management[37]. Without a clear thought in a decision-making process a whole process of waste management becomes an extremely difficult task[38]. As supported by[39], perception influences how a person feels, believe or preference towards a certain thing or an object around him/her, and how it tends to affect their actions. Thus, this study tested the relationship between awareness, perception, and attitude towards DSWM, where it is specifically hypothesised that:

H3 Awareness is positively correlated with attitude towards DSWM.

H4 Perception is positively correlated with attitude towards DSWM.

H5Attitude is positively correlated with participation in DSWM.

Furthermore, attitude has the potential to mediate the factors that influence public participation in DSWM. Previous studies reported on attitude as having a mediating role on the relationship between environmental knowledge and food waste reduction[40]; environmental concern and recycling behaviour[41]; environmental concern and intention to purchase green product[42]; and advertising appeal and behavioural intention[43]. All the findings showed that attitude was partially mediating the relationship between selected factors on environmental management activities. Corresponding to the above literature, it clearly makes sense to continue studying on the mediating effect of attitude between awareness and perception on households' participation in DSWM, as there are few studies on the mediating effect of attitude on participation in DSWM in a Tanzania context with application of the Development Communication Theory. Hence, this study postulates that:

H6 Attitude mediates the relationship between awareness and participation in DSWM.

H7Attitude mediates the relationship between perception and participation in DSWM.

Radio Usage toobtain DSWM Information

The improvement of any sector in society needs positive support from the media and the role of radio is not excluded. Media is a powerful factor that can influence the public to participate in solid waste management activities, as it has a special role of promoting environmental management behaviour. It also helps people understand the relationship between human and the environment. In waste management issues, mass media enhance the great knowledge, which in turn influences public participation in management issues. As reported by[36], mass media, especially radio, great chance on raising public awareness and consciousness towards environmental management issues with a high degree of effectiveness. Radio has a powerful contribution in environmental management issues as it creates awareness, educate, entertain and disseminate significant environmental information that offer solutions to environmental issues including DSWM[44].

Many developing countries, including Tanzania, use radio as a suitable communication instrument in raising public awareness and promoting sustainable solid waste management. As[45] argued, radio tend to raise individuals' consciousness on how they can properly manage their household garbage. The advancement of technology has eased the work of mass media on covering distances on environmental issues around the globe. Furthermore, radio also plays a significant role in disseminating appropriate information concerning DSWM issues that helps in overcoming its negative implications and contributes to national development[22]. As stated by[46], for a country's development, radio may act to promote a mutually beneficial relationship between community and the government.

Even though radio is mainly promoting solid waste management issues, many African media still fail to provide enough educational messages regarding the sustainability of proper solid waste management. That is why DSWM is still a big challenge in all African cities[47]. In addition, many mass media in Tanzania are commercially oriented, they focus more on politics, sports, and soap operas as these are thought to attract audiences and ultimately advertisers. Unfortunately, it was reported that listeners have low interest towards waste management programmes[45].

Conceptual framework

The Figure 1 shows the conceptual framework of the study which based on the literature reviewed.

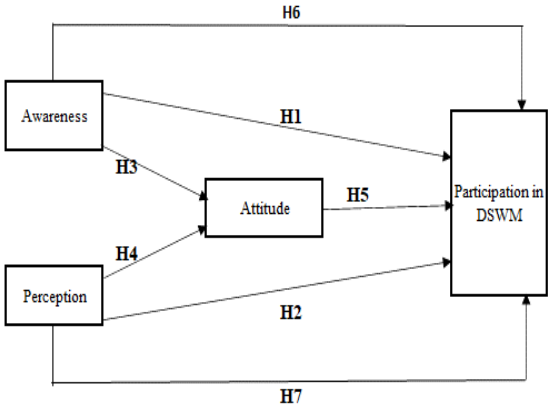

Figure 1: Conceptual framework of the factor influencing participation in DSWM

II. Material And Methods

The quantitative research design with the survey method was employed in this study. The stratified random sampling was used to obtain a sample size of 392 households, where the population was divided into four zones and a few housing estates were selected from each zone. The self-administered questionnaire was used as an instrument for data collection. Data collection started from September 21, 2019, until November 21, 2019.

Measurement of Variable

The questionnaire consist of seven sections, Section 1: Demographic characteristics such as gender, age, education level, employment status and residential topographical. Section 2: Radio usage information such as devices owned by respondents, devices that they often use to access the radio station, frequency of listen to radio on DSWM program per week and time spend on listening to radio program related to DSWM. Section 3: Awareness on DSWM measured by 10 items, for instance, "I am aware that burning domestic waste leads to air pollution" that is measured by a 5-point Likert scale, where 1 = not aware at all, 2 = not aware, 3 = slightly aware, 4 = aware, and 5 = highly aware. Section 4: Perception on DSWM with 10 items, example is "I think each family member should be aware of his or her obligation to collect and dispose of the waste properly" that is measured using a 5-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = slightly agree, 4 = agree, and 5 = strongly agree. Section 5: Attitude towards DSWM with 10 items, for instance, "I prefer bringing my own shopping bag to avoid plastic wastage" which measured using a 5-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = slightly agree, 4 = agree, and 5 = strongly agree. Section 6: Participation in DSWM with 10 items, for example, "I participate in recycling to minimize the quantity of waste dumped into the landfills" that measured using a 5-point Likert-like scale where 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always. Section 7 is an open-ended question for suggestion and recommendation.

Validity and Reliability

Before conducting the actual study, a pilot study was conducted to measure the flow and contents of the questions, the problems faced by the respondents and the estimated time taken to complete the questionnaire. Meanwhile, reliability tests were carried out on the variables of this study. Each variable was tested against Cronbach's alpha of .70 to assess the reliability of the items for the study variables.

The results for both the pilot and actual studies revealed Cronbach's alpha values ranged from .832 to .948 for the pilot study and from .734 to .946 for the actual study. The variable with the highest Cronbach's alpha was radio usage with (pilot study, α=.948; actual study, α = .946) and the lowest was participation (pilot study, α = .880; actual study, α = .734). In overall, the reliability coefficients for the pilot study and actual study were above the conventional value of .70.All variables were reliable as the Cronbach's alpha exceeds .70. Thus, this indicates that the dependability or consistency of the research instrument "fits" well with the actual reality.

Data Analysis

The data were analyzed using Statistical Package for Social Sciences (SPSS) version 23. To answer the objectives of this study, descriptive statistics such as mean, standard deviation and percentage were used for the demographic and radio usage information sections. Correlation is used to analyze the relationship among awareness, perception, attitude, and participation in DSWM. To test the mediating effect of attitude on the relationship between awareness and perception on participation in DSWM, a hierarchical regression was used.

III. Result and Discussion

Demographic characteristics of respondents

Out of 392 heads of households participated in this study, more than half were females (58.9%). Majority of them aged between 21-40 years old, with a low level of education (primary school level and below).

In the employment status, more than half the numbers of respondents are employed (58.2%) while 26.0% are unemployed. The remaining 15.8% are pensioners and housewife/homemakers. Finally, almost half the number of respondents lives in the high-density area (42.3%), followed by those who are living in the medium density area (21.7%), a few of them are staying in the low-density area (17.3%) and 13.3% are in the unplanned hill and the least percentage (5.4%) makes up of those living in the planned hill.

Radio Usage Information

Table 1 shows that the majority of respondents (80.1%) own radio set, followed by those who own mobile phone (64.8%), while the least number (1.0%) is having desktop devices. More than one-third of the respondents (37.5%) listen to DSWM programmes once a week, followed by those who spend six days (23.2%) in a week while only 10.7% of them listen to DSWM programmes every day. At the same time, more than half the number of the respondents (56.6%) spends less than 15 minutes listening to DSWM programmes, while only 2.6% of them spend 46-60 minutes and the rest (2.3%) spend 31-45 minutes.

In general, the findings imply that majority of the heads of households' own radio set and use them to access any radio program including DSWM programmes from the station that they wanted to listen to. This result is in line with a study conducted by[48] who found that in Tanzania, radio is a widely used device for listening to various programmes including environmental programmes.

Table no 1: Information related to radio use

Information Related to Radio Use	Categories	Frequency	Percent (%)
Devices owned by respondents	Radio set	314	80.1
	Mobile phone	254	64.8
	Television set	165	42.1
	Laptop	20	5.1
	Desktop	4	1.0
	Total	*	*
Day used to listen for DSWM programmes	Less than 1 day	147	37.5
	2-3 days	76	19.4
	4-5 days	36	9.2
	6 days	91	23.2
	Everyday	42	10.7
	Total	**392**	**100.0**
Time spends on listening to radio programme (minutes)	Less than 15 minutes	222	56.6

16 – 30 minutes	102	26.0
31 – 45 minutes	9	2.3
46 – 60 minutes	10	2.6
More than one hour	49	12.5
Total	**392**	**100.0**

* Multiple responses

The Relationships between Participation in DSWM and selected Variables

To answer the research objective of analyzing the relationship between awareness, perception, attitude and participation in DSWM in Dar es Salaam city, partial correlation analysis and zero-order correlation are used. Five hypotheses are tested and Table 4, shows that there is a strong relationship between attitude and perception (r = .708, p= .000); perception and awareness (r = .651, p = .000); and attitude and awareness (r = 628, p = .000). The results also show moderate relationships between attitude and participation (r = .585, p = .000); and perception and participation (r = .486, p = .000). Meanwhile, the relationship between awareness and participation was weak but positive and significant (r = .351, p = .000).

These results address the first objective which support all tested hypotheses (H1, H2, H3, H4, and H5). There are positive and significant relationships between all tested variables ranging from weak to strong. Thus, the more the heads of households have positive awareness, perception, and attitude towards DSWM issue, the more they become motivated to engage in the management process. These results support previous findings by researchers[32,34,35,49,50,51]. They found that individuals with high level of awareness, have positive perception and attitude towards waste management issues tend to be motivated to participate in management activities. That means the more heads of households aware and have positive perception and attitude towards DSWM, the more they become motivated to engage in it is management process.

Table no 3: Zero-order and partial correlation between awareness, perception, attitude, and participant in DSWM

Control Variables	**Variables (N = 392)**	**Mean**	***SD***	**Participation DSWM**	**Awareness**	**Perception**	**Attitude**
(Zero-order)	Participation DSWM	4.283	0.468	1			
	Awareness	4.113	0.567	r = .351, p = .000	1		
	Perception	4.234	0.491	r = .486, p = .000	r = .651, p = .000	1	
	Attitude	4.236	0.500	r = .585, p = .000	r = .628, p = .000	r = .708, p = .000	1
Attitude (partial)	Participation DSWM	4.283	0.468	1			
	Awareness	4.113	0.567	r = ─ .026, p = .305	1		
	Perception	4.234	0.491	r = .125, p = .006	r = .375, p = .000	1	

Mediating Effect of Attitude between Participation in DSWM and selected Variables

To answer the objective of identifying the mediating effect of attitude on the relationship between awareness and perception with participation in DSWM, hierarchical regression analysis is employed. Table 5 reveals that attitude fully mediates the relationship between awareness and participation in DSWM, where there is insignificant and negative reduction in Beta from .060 (p = .302) to − .088 (p = .119). This indicates that there is a full mediating effect. In addition, attitude only partially mediates the relationship between perception and participation in DSWM as the Beta has positive and significant reduction from .447 (p = .000) to .180 (p = .004).

The hierarchical regression results imply that attitude does have a strong influence in the relationship between awareness and participation in DSWM, where the high participation of the household heads can be influenced by their positive awareness which resulted from their positive attitude. On the other hand, attitude only partially mediates the relationship between perception and participation in DSWM. This indicates that the perception of the heads of households determines their attitude toward DSWM issues, hence influencing their

participation in management activities**.** Therefore, the participation of Dar es Salaam heads of households was not just be influenced by their perception but also their attitude towards DSWM issues.

Nevertheless, the insignificant mediation of attitude in the relationship between awareness and participation in DSWM might be related to the characteristic of the household members. This is based on the findings showing majority of the heads of households had low education level, residing in high density population and have low household income. The literature generally describes that individual with low education and income level as well as not believing on their actions may affect the public participation in domestic solid waste management process. As reported by[52], the individuals' behaviour may be influenced by positive attitude toward a specific issue but that attitude should be associated with higher levels of education, income as well as the trust they have towards the action. This was also supported by[53] in their environmental study conducted among students in Malaysia. They revealed that even though students had a high level of environmental concern, they did not participate in environmental management activities because they feel it was difficult and no physical benefit.

Table no 4: Hierarchical regression analysis for participation in DSWM with awareness and perception with attitude as Mediator

Model	**Variable**	**Unstandardized Coefficient**		**Standardized Coefficient**	***T***	***P***
	(*N* = 392)	***B***	***SE***	**Beta**		
1	(Constant)	2.276	.185		12.289	.000
	Awareness	.050	.048	.060	1.034	.302
	Perception	.426	.056	.447	7.664	.000
F = 60.796, *df* 1 = 2, *df* 2 = 389, *p* = .000; *R* = .488, R^2 = .238, R^2 Adj. = .234; *F* change = 60.796, *df*= 2, *df*2 = 389, *p* = .000						
2	(Constant)	1.823	.179		10.203	.000
	Awareness	− 0.073	.047	− .088	− 1.562	.119
	Perception	0.172	.059	.180	2.897	.004
	Attitude	0.479	.057	.512	8.438	.000
F =71.576, *df 1* = 3, *df* 2 = 388, *p* = .000; *R* = .597, R^2 = .356, R^2 Adj. = .351; *F* change = 71.195, *df*1 = 1, *df*2 = 388, *p* = .010						

IV. Conclusion and Recommendations

Out of 392 heads of households who participated in the study, most were females, aged between 21 to 40 years old with low level of education. However, they were mainly employed with low-income level of less than 300,000Tsh and residing in high density areas. Apart from that, majority of them own the radio set, which they use to access several programs including DSWM programs.

The study was conducted under the framework of Development communication theory whereby seven main hypotheses were proposed. The findings revealed that, all the hypotheses proposed are supported by positive correlation between all variables. Attitude is fully mediating the relationship between awareness and participation and partially mediating the relationship of perception and participation in DSWM. Thus, the households' awareness, perception and attitude do affect participation in DSWM. It is proven that attitude is a powerful construct in mediating the relationship between the tested variables.

The study is limited in its unit of analysis since it focused only to the heads of households, and this may have some impact on this study. Thus, the future research should consider widening the unit of analysis by including other household members.

The study also focused on the quantitative survey method to obtain DSWM information. Therefore, future researchers are recommended to adopt mixed method approach as it gives the chance to apply multiple methods for data collection such as in-depth interview, focus group discussion and survey questionnaire.

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