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Effects of Waste Management Customer Online Value Co-Creation on Sanitation Attitude and Advocacy: A Customer-Enterprise Dyadic Perspective

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Abstract: The study aims at establishing the benefits of actively utilizing the intangible resources of solid waste management customers in designing and implementing solid waste collection services, using the social media platforms. While Ghana generates high volumes of solid waste on a daily basis, less than half of it is effectively collected and disposed of. This calls for the adoption of innovative strategies to better connect and serve customers. Adopting a marketing approach to solid waste management has not been given much needed attention in Ghana and Africa, and this research sought to contribute in that direction. There is high usage of mobile telephony services in Ghana which a waste firm can explore to change negative attitude to waste disposal by the populace. Online co-creation is seen as a modern marketing approach leading to behavioral change in consumers. In this regard, the study looked at customer online co-creation in the solid waste collection sector in Ghana. The study adopted the survey strategy using structured questionnaire as the measure instrument, and data analyzed using both the structural equation model (SEM) and hierarchical multiple regression. The key findings are that customer intangible resources (online experience and skills) can be tapped by waste firms to co-create services that would generate positive attitude towards sanitation issues and the willingness to advocate the services and programs of the firm. Similarly, waste firms must invest in well-functioning and information rich digital platforms, and to devise innovative strategies to direct traffic to these platforms for effective customer participation.

Keywords: co-creation; sanitation; solid waste; SEM; digital platform

1. Introduction

Sanitation has a key role to play in sustainable urbanization, and this needs to be fully incorporated into the current thinking about, among other things, green cities [1]. It is estimated that half of the world's population of now live in urban centers, and these cities are experiencing rapid growth with the associated higher volumes of waste generation [1,2]. Various studies by world bodies like the United Nations and the World Bank show that most of this growth is taking place in cities of low- and middle-income countries in Africa and Asia [2]. It is also estimated that by the year 2100, the world's population will reach 11.2 billion with Africa alone contributing 39%, according to United Nations Department of Economic and Social Affairs, Population Division (UNDESA) 2015 Report. Despite these projections, the various countries within the African region have not provided the required capacity and funding to effectively manage current waste generation and to meet future high volumes of solid waste generation.

In spite of the high volumes of household waste generated in developing countries, less than 30% is properly discarded [2,3]. Ghana generates about 12,700 tons of waste per day, and this translates to 0.47 kg per person per day, given the current population of 27 million [4], but only 29.8 percent of households in urban areas have their refuse collected by waste firms, while 52 percent dispose of their rubbish through a public dump site [5] (p. 93). Solid waste management has thus become an albatross around the neck of various African countries. Poor sanitation, therefore, remains a major public health concern in Africa. Factors which have mostly contributed to the complicated solid waste management (SWM) in developing countries include urbanization, inequality, economic growth, cultural and socio-economic factors, policy, governance, institutional issues, and international influences [6].

Public and social health are paramount not only to individual governments in the world, but the United Nations (UN) as well. The world body, in a bid to achieve the Millennium Development Goals (MDGs), encourages governments to implement social intervention programs that lead to improvement in basic services for health, education, water and sanitation. In September 2015, Heads of State and Governments adopted the 2030 Agenda for Sustainable Development which includes the 17 Sustainable Development Goals (SDGs) [7]. The SDGs build on the success of the MDGs. The Goal 6 of the SDGs is to ensure availability and sustainable management of water and sanitation. This calls for a participatory, community-led strategies which are aligned with national development priorities and strategies [8].

Among other things, the UN also recommends the greater involvement of the private sector through the public-private partnership arrangements (PPP) for the purposes of generating much bigger funds and the development and infusion of new technologies into economic growth. To this end, nations are to adopt “... integrated waste management systems, in partnership with all relevant stakeholders and with international financial and technological support, as appropriate” [9] (p. 27). Currently in Ghana, there are few private waste management firms, the majority of which are located in Accra and Kumasi [4], with just one being present in all the ten administrative regions of Ghana. These private waste enterprises handle more than 60% of solid waste generated in the cities of Ghana [10].

Co-creation is defined as “the benefits realized from integration of resources through activities and interactions with collaborators in the customer’s service network” by [11], and as “an active, creative and social process, based on collaboration between producers and users that is initiated by the firm to generate value for customers” by [12]. The co-creation concept has been applied to various industries and sectors, but not much to the solid waste collection service sector, in particular, through the digital platform. Again, most studies on waste management had been approached from the technical perspectives, not much from the marketing perspectives. Given the fact that advanced technology has empowered the customer (in knowledge and skills), active digital engagement of the customer in sanitation value creation cannot be underestimated, if much is to be achieved in sanitation and health. Co-creation is about tapping into the skill and knowledge base of a firm’s stakeholders, especially customers, to plan, design, implement, and assess value creation projects. This is to avoid major opposition, such as non-acceptance or boycott, to final product or service provided by an enterprise.

While studies in the health sector, for instance, have shown that customer value co-creation leads to increase well-being of patients [13], there are not many studies on the impact of waste management customer value co-creation, through active online engagement, on attitude change and advocacy for good sanitation. More so, studies on customer value co-creation, connected to sanitation and health are largely based on advanced economies, with little coming from least developed and developing countries. The primary objectives of this study are, therefore, to (1) examine the impact of solid waste collection service customer value co-creation activities on his/her attitude and advocacy activities through online platforms, and (2) to make appropriate theoretical and managerial recommendations.

To achieve these objectives, the paper is structured as follows: Section 2 provides a review of literature on the key areas of the topic; Section 3 presents the hypotheses developed for the study

followed by the empirical study in Section 4. Section 5 details the discussion from the analysis, recommendations made, limitations and suggestions for future study.

2. Conceptual Development

To help better understand customer co-creation activities with regard to waste management, some theories and perspectives on waste management, social media and co-creation, customer attitude and advocacy were reviewed. The conceptual model was developed and hypotheses formulated from the review.

2.1. Public Health-Waste Management Linkages

The need to establish an effective SWM system in order to have improved public health system has historical antecedents. According to [14], the first clear linkages between disease and poor sanitation were established in the late 1830s when the sanitation revolution began in London. According to the World Health Organization (WHO), health is defined as ‘a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’ [15]. From this definition, health is dependent on economic, social and environmental conditions, and therefore connected with issues such as poverty, gender equality, education, growth and others which are crucial for sustainable development [16]. The Rio Declaration on Environment and Development, signed in 1992 by 170 countries, also acknowledges the links between health and development [15].

Various studies have also established a direct linkage between waste management and public health and their impact on socio-economic development of a nation [2,12]. A World Health Organization 2012 study established a positive correlation between improvement in sanitation management and health. The study showed that for every \$ 1 (US Dollar) invested in sanitation, there was a corresponding saving of \$ 5.5 (US Dollar) on health costs and \$ 5.5 return on productivity [17]. Clearly, waste management has an important role in a nation’s development, and thus calls for a more pragmatic and efficient approach to designing, implementing and assessing it. While marketing and communication are important to achieving efficiency, it is equally imperative for the waste firms and governments to provide effective and efficient services in order to develop efficient waste management system. The authors believe that failure to provide quality services may affect the design and implementation of waste management systems. Based on the above discourse, it is clear that adoption of market-based strategies to manage waste would be a step in the right direction.

2.2. Market-Based Approach to Waste and Sanitation Management

Household/customer adoption and use of best sanitation and waste management practices requires knowledge, attitudinal, and behavioral change, and it is a market-based approach to waste management that would unearth the inefficiencies which are barriers to such changes [18]. Household/customer attitude towards SWM in most developing countries is influenced by mostly cultural and socio-economic factors, such as beliefs and literacy rate respectively [19].

Therefore, to overcome negative public attitudes and unsustainable behavior towards waste management, which have been shaped by cultural and socio-economic elements, a waste enterprise would need to design an effective communication strategy that leads to a broad public understanding of the requirements of SWM and active participation of all relevant stakeholders throughout all project stages [6], and which takes care of all cultural and socio-economic idiosyncrasies. These may include strategies like building project supporters before implementation, developing a comprehensive understanding of causes of opposition to “Not In My Backyard” (NIMBY) attitude, and acting to remove them through stakeholder consultation, correction of misinformation, and compromise [6]. Such measures have been found effective in sustainable behavior towards SWM. NIMBY opposition, for example, is often based on a series of deeply held beliefs, some of which are rational and others emotional [20], and it is through an appropriate stakeholder consultation that such beliefs can be altered.

However, achieving attitudinal and behavioral change through “large public meetings can be a recipe for disaster” [20]. Gilmour [20] suggests the use of smaller, manageable interactive sessions, making direct contact with the target audience. In an industry, such as the SWM industry, where the target audience are wide spread, more effective means of collaboration would be needed to implement such suggestion, and this is where advanced technologies such as social media platforms can be of immense help.

Marketing plays an important role in shaping attitudes and beliefs. Applying market-based concept, also known as sanitation marketing (SanMark), to waste management has been found to achieve results in some developing countries. For instance, a World Bank Water and Sanitation Program report on sanitation marketing in Cambodia (2012) showed households from four provinces purchased a total of 10,621 unsubsidized Easy Latrines from local private enterprises, leading to a 7.7 percentage point increase in improved household sanitation coverage from a baseline of 24 percent in less than two years. The program applied the marketing mix principles and the beneficiaries seen as target market [21]. This example has been cited to buttress the fact that much could be achieved in improved household sanitation coverage, and by extension solid waste, without subsidies when these two concerns are handled from marketing perspective. What sets sanitation marketing apart from conventional approaches to sanitation service provision is the focus: *that sanitation marketing is focused on the private sector and households are seen as consumers rather than beneficiaries* [22]. Thus, sanitation marketing aims at increasing demand for sanitation and strengthening private sector capacity to supply sanitation products and services effectively and efficiently [21].

Private sector participation (PSP) in waste management has become a key requirement for assessing financial aid from international finance institutions (IFIs) [14] by governments from developing countries. Private sector involvement is seen as a major driver in effective waste management. One cannot talk of private sector participation without talking of competition for market share and therefore, profit. These demand excellent market communication strategies, necessitating the need for the application of marketing in waste management. This establishes an enterprise-customer relationship scenario in the modern day waste and sanitation management. Market-based concept, by implication, is empowering communities and individuals to make their own informed decisions with regard to acquiring sanitation products and services [23]. It is also to ensure the financial (economic consideration) well-being of the firm. Thus, in designing waste and sanitation products and services, views or inputs from actual and potential beneficiaries, as well as manufacturers of sanitation equipments should be sought. This is to avoid repetition of past models that have not worked.

2.3. System Approach to Waste Management

According to Marshall and Farahbakhsh [6], waste management is a complex task and therefore requires appropriate technical solutions, sufficient organizational capacity, and co-operation between a broad spectrum of stakeholders. Solid waste collection is part of a broader system, involving relationships that must be managed in a holistic manner. However, this broader perspective of waste increases the difficulty of managing it, and thus requires a model that can handle complexities [6].

Most waste system models which have been used as decision-support tools for planning processes, and for monitoring and optimizing SWM systems were developed in the developed economies, especially Canada and the United States [24]. These models are often found to be misfit for the developing countries' context, even though they are applied in these countries, resulting in little success. This is because even in the developed country context, none of the models considered involving all relevant stakeholders such as communities and rag pickers [6]. In effect, the largely unsuccessful nature of the various system models calls for a more holistic model that address the “interconnectedness of socio-cultural, environmental, economic, and technical spheres” of SWM [6]. Thus, Wilson [14] recommended the need to have an integrated and more sustainable SWM system models that are specific to developing country contexts.

2.4. Stakeholder Theory

Stakeholder engagement in solid waste management and sanitation has been found to be critical and essential for the successful development of sustainable sanitation services and behavior change [1]. According to [1], there are four main arguments justifying inclusive stakeholder involvement in the sanitation sector. These are ownership, efficiency, better design and empowerment. These are the backbones of sustainable service delivery as they ensure efficiency and effectiveness.

2.5. Joint Agencial Experiential (JAE) Value Co-Creation

The JAE logic requires a “shift in thinking to engaging stakeholders personally and collectively in creating brand value together” [25]. It is to effectively harness consumers’ desires and expectations through physical and virtual touchpoints through a purposefully designed brand-consumer engagement platforms; to turn them from passive actors (operand resources) into active participants (operant resources), capable of generating value to the brand. Thus, engagement constitute a core function of joint agencial experiential value co-creation. Though involving multiple human actors in co-creation venture is a daunting task, the firm could apply technology to facilitate the task of interacting with multiple stakeholders. The JAE is, therefore, an integrative framework which synthesizes the joint agency of experiential co-creators (consumers and other actors) with that of co-creational enterprises, which act as the nexus of platforms of engagements, and the organizer of the joint agency. Thus joint agency of co-creation seeks to address the gaps identified in the existing firm-customer brand co-creation literature.

One key objective of the JAE is to bridge the existing gap between academic and practitioner approaches to brand engagement [25]. The gap is that practitioners tend to focus mainly on process based concept of engagement, reducing the engagement to principal-agent form of relationship. JAE framework provides the theoretical foundation of digital brand value co-creation. This work seeks to build on this framework, and to apply it to a different industry and geographical location—solid waste collection industry in Ghana.

2.6. Co-Creation in Waste Management

One gap identified for this study is the apparent lack of studies on waste management customer as value co-creators through the digital platform, especially in Africa. Another obvious gap is the fact that studies on private sector companies involved in SWM on the African continent are often limited to the assessment of their performance with regard to their collection and disposal of solid waste and recycling; not much on the active involvement of their key stakeholders in idea generation to design and implement novel ideas that could generate superior customer satisfaction and, therefore, positive brand attitude and brand advocacy [26]. Customer involvement in waste management co-creation is very weak, and often ends at the contract stage [27]. Though there are literature on how to involve stakeholders in waste management such as Waste Aid Toolkit [28], private waste management firms in Ghana have not been directed, through empirical studies, as to how to embrace value co-creation to brand their services through digital platforms. This study is an attempt to fill these gaps.

3. Hypotheses Development

3.1. Customer Co-Creation Resources

Co-creation has been a subject of academic research recently. This is as a result of the work of Vargo and Lusch [29] on the Service-Dominant (S-D) logic framework. The proposition of the S-D logic framework is that an organization and its stakeholders exchange services in the form of knowledge and skills for the benefit of a party. While Ramaswamy and Ozacn looked at co-creation from the digital point of view [25], and that there is the need for firms to invest in technological infrastructure for better dialog during co-creation [30], Gyrd-Jones and Kornum [19] recommended that firms should remain open to inputs from all stakeholders in order to maximize co-creation. For several decades, economic

transactions, and therefore marketing, had focused more on dominant logic principle, which relied on tangible resources, embedded value, and transaction as its central focus [29]. New perspectives have, however, emerged that tout the tapping of intangible resources, such as skills and knowledge of consumers, as the key to marketing in the digitalized world.

The digital platform has now endowed both firms and consumers with new capabilities. This has led to the emergence of new business models such as crowd-based business models (CBBMs) [31] and co-creation. Therefore, consumers and other stakeholding individuals have moved from being passive, operand resources (resources on which an operation or act is performed to produce an effect) to operant resources (resources which are employed to act on operand resources, and other operand resources) [29]. Madhavaram and Hunt [32] identified three hierarchies of operant resources: (1) *basic*, operant resources (BORs), (2) *composite*, operant resources (CORs) and (3) *interconnected*, operant resources (IORs). The authors defined basic operant resources as “the underlying, lower-level, resources that form the building blocks of higher-order, operant resources”, and composite operant resources as “a combination of two or more distinct, basic resources, with low levels of interactivity, that collectively enable the firm to produce efficiently and/or effectively valued market offerings”. Finally, the authors defined interconnected operant resources as “a combination of two or more distinct, basic resources in which the lower order resources significantly interact, thereby reinforcing each other in enabling the firm to produce efficiently and/or effectively valued market offerings”. According to the authors, an entity is a resource to the enterprise if it contributes to enabling the enterprise produce efficiently and effectively a market offering that has value for the target market. Thus, basic, operant resources are those lower-level resources, such as the skills and knowledge of individual employees and customers, that form the building blocks of the higher-order, operant resources [32]. Consumers are now productive resources [33] of the 21st century firm, as well as co-producers and by extension joint “heirs” to the value creation process of the enterprise. They are, therefore, needed in effective branding in the digitalized global economy. Based on these findings, we hypothesize the following:

Hypothesis 1 (H1). *Customer online experience positively influence customer online co-creation activities.*

Hypothesis 2 (H2). *Customer digital skills (ability) positively influence his/her online co-creation activities.*

Hypothesis 3 (H3). *Experience and ability influence each other in co-creation.*

3.2. Social Media, Social Learning and Value Co-Creation

Social media has provided a new paradigm for brand-customer relationship management, and for that matter, branding activities. Previous studies have opined that social media branding improves brand-customer intimacy, reduces misunderstandings towards brands, improves loyalty, and generates more positive word of mouth [34]. Changing behavior has been found to be complex and difficult, and that the key driver to change behavior at the individual, interpersonal and community level depends on social norms [35]. Thus, individual behavior is influenced by social norms established through network interactions with friends, family members and associates. Therefore, intrapersonal and interpersonal factors impact personal behaviors such as knowledge, attitude, beliefs and personality, and provide social identity, social status and social norms respectively [36].

Behavioral studies on environmental and climate change impact on health show that communicating health benefits of proper environmental management instead of the threats achieves greater support from the public for such policies [37]. The rationale behind this phenomenon is that people are likely to engage more in actions they believe they can influence than those they feel hopeless or angered about, a phenomenon known as perceived self-efficacy [37]. Information communication is, therefore, a key in shaping social learning and subsequent involvement of the public in initiatives aim at improving public health, and this is where social could be exploited to shape social learning.

When stakeholders engage in a dialogue, knowledge is produced and shared. The learning opportunities from such engagement, however, needs to be nurtured [38]. Studies on social learning opined that individuals/consumers learn about products and services from various contact/data points such as friends, family, social media and personal experimentation.

A review by Dupas on health behaviors in developing countries showed that households in developing countries often lack credible information on the benefits of investing in preventive behaviors. Since health and sanitation are inseparable, it can be inferred that lack of information on effective waste management has resulted in households' underinvestment in positive waste management behaviors in developing countries. Dupas revealed that individuals would respond to information about the quality of their environment and the risks they face, and that information campaigns about specific prevention techniques are able to make a difference in household behavior. Achieving the required behavioral change largely depends on the type of information provided, the target/recipient, and other moderating factors: gender of the head of the household, the willingness to invest in preventive behavior, education of the recipient, and the availability and cost of adoption of new technologies.

Although there is a dearth of literature on the health-cognitive ability gradient in Africa, evidence from other developing countries show that ability to digest information on health promotion from media sources has a positive impact on preventive behaviors [39]. Similarly, cognitive ability of citizens would be able to make an impact on household and community waste management sanitation, and therefore impact on health. Another factor that influences behavior change in health related issues is monetary incentives [40]. Thornton [40] shows that monetary incentives are effective at increasing behavioral change. However, this might not work in an industry where the target market is very large like the solid waste sector.

Technology has empowered the average consumer by making available information which the firm, hitherto, was the only entity privy to. The internet, for example, has created a worldwide network of organizations and individuals such that volumes of information are produced and shared on daily basis, thereby deepening and enhancing skills and knowledge acquisition. This has virtually dissolved the sharp, rigid boundary that used to exist between an enterprise and its stakeholders during the pre-advanced technology era, making a firm's stakeholders part and parcel of the firm's key decision units.

Co-creation is a form of continuous collaborative venture aim at tapping into the 'wisdom of crowds', a concept known as *customer knowledge value* [41]. One benefit of collaboration through digital platforms is that it allows firms to engage, more than ever before, in timely and direct end users contact at a relatively lower cost and higher efficiency than the traditional communication tools [41,42].

Co-creation and crowdsourcing are often used interchangeably. The reasons for this are that both are considered part of open innovation, and therefore depend on the participation and expertise of the crowd. However, the relationship in co-creation is deeper and richer, and is to be a continuous one, while crowdsourcing relies on people as a source of labor to create an idea for a specific project and the relationship often ends at the end of the project, for example, Wikipedia [41]. Therefore, crowdsourcing is considered a subset of co-creation. In co-creation, people contribute their skills and knowledge to an idea in which they believe for its virtues. Based on the aforementioned, we deduce the following hypotheses:

Hypothesis 4a (H4a). *Online co-creation has a positive effect on online advocacy.*

Hypothesis 4b (H4b). *Online co-creation has a positive effect on attitude.*

3.3. Advocacy (Word-of-Mouth)

Positive word of mouth (WOM) may evoke favorable consumer reactions. Similarly, negative WOM may damage the image of the brand. Social media has helped spread customer reaction faster than before, and this calls for the use of the same technology to effectively manage customer reactions. According to Relling, Schnittka, Sattler and Johnen [43], rather than deleting unfavorable or negative user post/comments/reviews (as doing so may erode credibility of the brand and diminish positive community member reactions in the process), the reviewers or commenters could actively engage to explain the rationale behind their posts. WOM is the inclination to express a positive opinion about a program to others such as friends and family members to encourage them to subscribe to a program [44]. Therefore, a more satisfied customer is more likely to promote a product or service. Based on the above, we propose the following:

Hypothesis 5a (H5a). *Online experience has a positive effect on online advocacy (e-WOM).*

Hypothesis 5b (H5b). *Online ability has a positive effect on online advocacy.*

Hypothesis 5c (H5c). *Online advocacy positively influence attitude towards waste firm's sanitation programs.*

3.4. Brand Attitude

Literature supports the fact that there is a direct relationship between consumers' attitude and purchase intentions [45]. Branding studies affirm that positive attitude towards a brand leads to greater likelihood of searching for the brand, especially on the web [46]. Again, it is proven that brands which offer good experiences positively influence behavioral intentions, and result in positive attitude towards the brand [47]. Thus, we hypothesize that:

Hypothesis 6a (H6a). *Experience has a positive effect on attitude.*

Hypothesis 6b (H6b). *Ability has a positive effect on attitude.*

3.5. The Potential Influence of Willingness, Digital Platform and Customer Satisfaction on Online Creation and Its Outcome

3.5.1. Willingness and Technology

A waste firm's adoption of co-creation approach to waste management may encounter difficulties if there are insufficient resources (e.g., technology and the willingness to co-create) on the part of the customer [48]. Facilitating access to internet for the marginalized in society could, therefore, positively reinforce household's attitude to waste separation and the willingness to properly disposal [49]. Similarly, co-creation success is dependent on the ability and willingness of co-creators and the enterprise's motivation and technological infrastructure to set up and effectively management a digital engagement platform [26]. We, therefore, suggest the following hypotheses:

Hypothesis 7 (H7). *Willingness to co-create positively moderates online co-creation.*

Hypothesis 8 (H8). *Willingness positively moderates customer attitude and advocacy*

Hypothesis 9 (H9). *Technology (digital platform) positively moderates online co-creation.*

Hypothesis 10 (H10). *Technology positively moderates online advocacy and attitude.*

3.5.2. Customer Satisfaction

Consumer satisfaction is a fundamental determinant of long-term business success [50]. It is a well-studied topic in marketing research, and consumer satisfaction has a moderating effect on consumers' post purchase behavior and loyalty. Hudson, Huang, Roth, and Madden [51] posits that consumers derive much satisfaction through greater attachments to brands and firms that better understand and respond to their (consumers) needs. This results in more brand loyalty and profitability. This is confirmed by the study by Cambra-Fierro, Pérez, and Grott [52] which concludes that co-creation has a direct relationship with customer satisfaction, customer loyalty, and word-of-mouth (WOM). We propose that:

Hypothesis 11 (H11). *Customer satisfaction positively moderates the relationship between co-creation and attitude change and advocacy.*

Figure 1 summary of the proposed relationship among the above research variables.

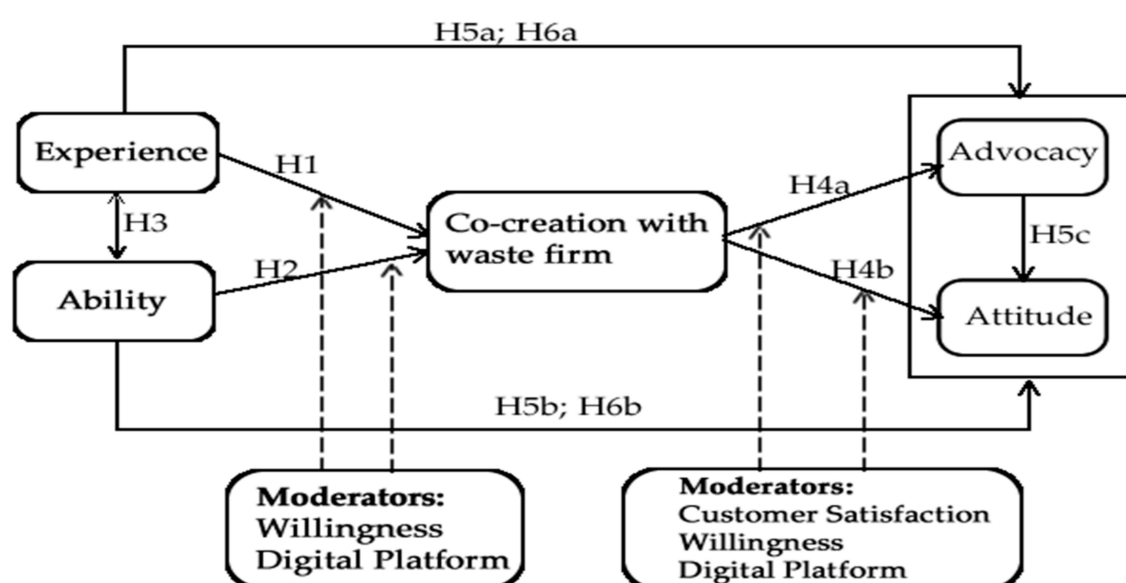


Figure 1. Conceptual Model.

4. Materials and Methods

A structured questionnaire was used to obtain information from the study sample. A Likert scale with 5-level items, from strongly disagree (1) to strongly agree (5) was applied. The survey instrument consisted of eight latent variables with varying number of items: experience (13 items); ability (5 items); co-creation (8 items); advocacy (4 items); attitude (2 items); willingness (5 items); satisfaction (3 items); and digital platform (14 items). All the items in each variable except one (attitude) were pruned down for the final analysis. Existing validated questions were adopted where possible in the survey instrument. Some items were self-developed to fit the study context, taking into consideration the literature review. Measures used are provided in Appendix A. Items under experience were adopted from [53], items under co-creation were adopted from varied sources and those under digital platform were mainly from [54]. The rest were self-developed. The measures were also pre-tested on a pilot study to ascertain its comprehension and validity, after which the items were refined for final administration.

The questionnaire was administered in selected areas/zones of two metropolitan cities (Accra and Kumasi), one municipality (Koforidua) and one district level town (Akwatia-Eastern Region) in Ghana. The sample was mainly household heads in urban centers in Ghana. The main reason for limiting the study to urban centers is the fact that private waste firms in Ghana operate mainly in the big

cities with the exception of Zoomlion Ghana Limited which operates in all the administrative regions of Ghana [4]. Ghana has ten administrative regions, which are further divided into metropolitan, municipal and district assemblies (MMDAs). The last population and housing census in Ghana in 2010 indicates that the three most populated regions are Ashanti (capital, Kumasi), Greater Accra (capital, Accra-the national capital) and Eastern (capital, Koforidua) [55], p. 51. Akwatia, a diamond mining town, is the capital of the Dekyembour district in the Eastern Region. In all, Ghana has a population of 24, 658, 823 as at 2010. The current population is estimated to be 27, 043, 093 [5]. There are six (6) metropolitan assemblies (Accra, Kumasi, Tema, Sekondi-Takoradi, Cape Coast and Tamale), forty-nine (49) municipalities (including Koforidua), and one hundred and sixty one (161) districts (including Akwatia) [4].

Accra and Kumasi metropolitan assemblies are the only two assemblies with population above one million; the remaining eight of the ten regional capitals have populations ranging from 100,000 to 600,000.

A household in Ghana is defined as “a person or a group of persons, who live together in the same house or compound, share the same house keeping arrangements and recognize one person as the head of household” [55] (p. 69). As of 2010, there were 5, 467, 136 households in Ghana, with 55.8% of them in the urban areas. Ashanti (20.6%), Greater Accra (19%) and Eastern (11.6%) have the highest proportions of households. The rest of the regions have household proportions below 10%.

Fifteen final year marketing students of Koforidua Technical University, Ghana, were selected and trained to administer the questionnaires. The questionnaires were self-administered, but administrators provided clarification where necessary. A key criterion for selection was whether the respondent uses social media for social interactions. This was purposely used to be able to meet the objectives of the study. Another criterion was that the household must be serviced by a private waste firm. This was also important as the study seeks to establish household relationship with solid waste collection firms.

Although the sample size was limited to three cities and one town from three regions, it is a fair representation of the urban population dynamics in Ghana. Accra and Kumasi are more cosmopolitan in nature and have residents coming from all the regions of Ghana and outside the country as indicated by [55]. Koforidua (also known as New Juaben Municipality) has diverse ethnic composition, while Akwatia as a mining town attracts people from all parts of the country.

A total of 500 questionnaires were distributed using convenience and purposive sampling techniques, and 431 were retrieved, representing 86% response rate. The final number used for the study was 407. The questionnaires were administered between November 2017 and February 2018.

Data was analyzed using both the Structural Equation Model (SEM) and hierarchical multiple regression tools. SEM was employed to establish the causal relationships between the main constructs, while the hierarchical multiple regression was used to explore the effects of the moderators on the constructs.

5. Results

5.1. The Measurement Model

A confirmatory factor analysis (CFA) was applied to investigate the associations between items and constructs. Further, SEM was applied to explore the causal relationships between the constructs. Experience (EP) and ability (AB) are the independent variables, attitude (AT) and advocacy (AD) are the dependent variables, co-creation (CC) is the mediating variable and customer satisfaction (CS), willingness (WL) and digital platform (DG) are the moderating variables. An exploratory factor analysis (EFA) was first conducted to find out items that would pool together to measure the same factor, using SPSS Analysis of Moment Structures (AMOS) program. Some items were dropped after the EFA as they were found to be problematic. CFA was then applied to the five fixed components obtained from the EFA using Promax rotation and the maximum likelihood extraction method. In order to obtain a better model fit, the item errors from CC1 and CC2, as well as CC3 and CC4 were correlated. Table 1 shows the descriptive statistics of the final items used for the CFA. Items under attitude and

customer satisfaction had the highest average mean score of 4.04 each, while items under co-creation had the lowest average mean score of 2.72.

Table 1. Descriptive Statistics of Measurement constructs ($N = 407$).

Construct Item	Minimum Score	Maximum Score	Mean Score	Average Mean Score	Factor Loadings	Cronbach Alpha
EP5	1	5	3.31		0.805	
EP6	1	5	3.37		0.783	
EP7	1	5	3.49		0.808	
EP8	1	5	3.33	3.40	0.811	0.919
EP9	1	5	3.44		0.748	
EP10	1	5	3.54		0.828	
EP11	1	5	3.34		0.719	
AB1	1	5	3.85		0.555	
AB2	1	5	3.59	3.80	0.835	0.700
AB3	1	5	3.95		0.582	
CC1	1	5	2.65		0.666	
CC2	1	5	2.70		0.788	
CC3	1	5	2.82		0.777	
CC4	1	5	2.77	2.72	0.761	0.915
CC5	1	5	2.55		0.684	
CC6	1	5	2.86		0.770	
CC7	1	5	2.71		0.777	
CC8	1	5	2.67		0.836	
AT1	1	5	4.02		0.901	
AT2	1	5	4.06	4.04	0.759	0.815
AD2	1	5	4.00		0.586	
AD3	1	5	3.91	3.96	0.619	0.741
AD4	1	5	3.97		0.823	
WL1	1	5	4.12		0.804	
WL2	1	5	3.97		0.772	0.780
WL3	1	5	3.92	3.93	0.609	
WL4	1	5	3.71		0.542	
CS2	1	5	3.99		0.754	
CS3	1	5	4.08	4.04	0.679	0.675
DG1	1	5	2.98		0.784	
DG2	1	5	2.99		0.788	
DG3	1	5	2.93		0.823	
DG4	1	5	2.94		0.725	
DG5	1	5	3.30	3.06	0.698	0.918
DG6	1	5	3.08		0.693	
DG7	1	5	3.16		0.685	
DG8	1	5	3.13		0.683	

Note: EP = Experience; AB = Ability; CC = Co-creation; AT = Attitude; AD = Advocacy; WL = Willingness; CS = Customer Satisfaction; DG = Digital Platform.

Cronbach alphas and composite reliabilities were higher than the recommended thresholds of 0.70 with the exception of ability which registered 0.70 for both Cronbach alpha and the composite reliability the average variance explained (AVEs) were also within acceptable ranges, given the fact that the research context is fairly new. The AVEs of the latent constructs were also compared to the square of the correlations among them to test for the discriminant validity, See Table 2. The measurement model demonstrates convergent validity (items load well on the constructs) and discriminant validity (constructs measuring different things). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.889 ($\rho = 0.000$) and the Bartlett's test of sphericity was significant ($\rho = 0.000$).

In summary, though high reliability and internal consistency are necessary conditions for validity, they are not sufficient; once the instrument considers all aspects of the construct being measured, the construct should be considered valid [54].

Table 2. Discriminant validity assessment ($N = 407$).

Variable	1	2	3	4	5
1 Experience					
2 Ability	0.45–0.62				
3 Co-creation	0.58–0.62	0.58–0.45			
4 Attitude	0.69–0.62	0.69–0.45	0.69–0.58		
5 Advocacy	0.47–0.62	0.47–0.45	0.47–0.58	0.47–0.69	
Cronbach alpha	0.92	0.70	0.92	0.82	0.74
Composite reliability	0.92	0.70	0.92	0.81	0.72

Note: AVEs > r^2 .

5.2. The Structural Model

The fit indices for the structural model suggested an excellent fit. The χ^2 of the structure model is 418.59 with 218 degrees of freedom ($\chi^2/df = 1.92$, $p < 0.000$), which is within the threshold of between 1 and 3. The other measures all had excellent values. The comparative fit index (CFI) is 0.957 (>0.95), the root mean square residual (SRMR) is 0.047 (<0.08), and the root mean square error of approximation (RMSEA) is 0.048 (<0.06). The other goodness-of-fit measures are GFI = 0.920 (>0.9), AGFI = 0.898 (>0.8), and NFI = 0.915. More than 97% of the standardized residual covariance were within the acceptable range (between +2 and −2). Therefore, the model displays a good overall fit. The structure model with standardized path coefficients is shown in Figure 2.

The results showed a significant positive relation between experience and advocacy (H3a: $\beta = 0.34$, $\rho < 0.01$) and with co-creation (H1: $\beta = 0.27$, $\rho < 0.01$); between ability and advocacy (H4b: $\beta = 0.33$, $\rho < 0.01$), ability with attitude (H4a: $\beta = 0.20$, $\rho < 0.01$); and between advocacy and attitude (H6: $\beta = 0.54$, $\rho < 0.01$). Three out of the ten path coefficients were not significant: ability and co-creation (H2), co-creation and advocacy (H5a) and co-creation and attitude (H5b). These three non-significant paths were explained by the presence of confounding variables as indicated in the moderator analysis (Table 3).

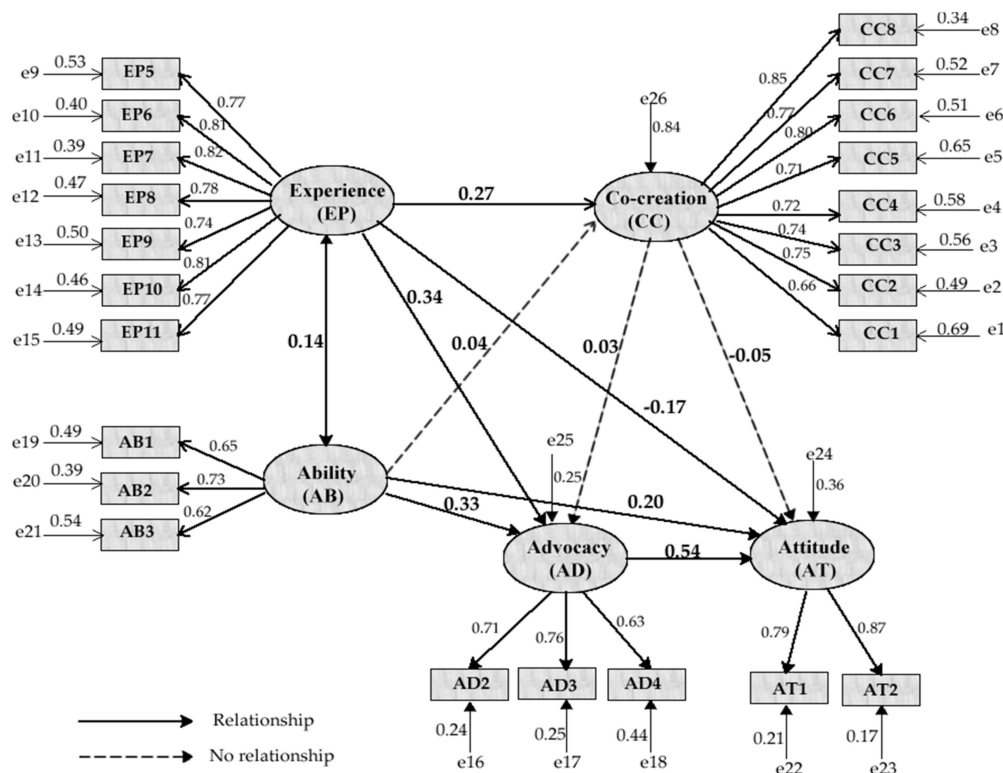
**Figure 2.** Structural Equation Modeling (SEM).

Table 3. Hypotheses Test Result Summary.

Hypotheses	Paths	Path Coefficient (β)	Result
H1	Experience \rightarrow Co-creation	0.27 **	Supported
H2	Ability \rightarrow Co-creation	0.04	Not Supported
H3	Experience \leftrightarrow Ability	0.14 **	Supported
H4a	Co-creation \rightarrow Advocacy	0.03	Not Supported
H4b	Co-creation \rightarrow Attitude	−0.05	Not Supported
H5a	Experience \rightarrow Advocacy	0.34 **	Supported
H5b	Ability \rightarrow Advocacy	0.33 **	Supported
H5c	Advocacy \rightarrow Attitude	0.54 **	Supported
H6a	Experience \rightarrow Attitude	−0.17 **	Supported
H6b	Ability \rightarrow Attitude	0.20 **	Supported

** $p < 0.01$.

5.3. Assessment of Moderator Effects

After confirming the influence of the main effects in the model, we tested for moderator effects. A hierarchical multiple regression was conducted for the effects.

5.3.1. Moderator Effect on Advocacy

The output from correlation (Table 4) in the hierarchical regression between the variables and advocacy, show that satisfaction has the strongest relationship with advocacy ($r = 0.398$, $p = 0.000$). The correlations also indicate a strong relationship between co-creation and digital platform ($r = 0.511$, $p = 0.000$), and between experience and co-creation ($r = 0.250$, $p = 0.000$). This demonstrate the moderation of online co-creation by digital platform.

The R^2 of blocks 1 and 2 is 0.279, with predictors in block 1 (Digital platform, Satisfaction, Willingness and Co-creation) accounting for 0.228 of the R^2 change (Sig. F Change = 0.000) and the addition of experience and ability adding the remaining 0.050 of the total R^2 change (R^2 Change = 0.050, Sig. F Change = 0.000). This indicates the first four variables account for significant variance in online advocacy (23%), while experience and ability (digital skills) account for additional 5% of variance in online advocacy which is also significant. The ANOVA result also showed the model to be significant ($p < 0.01$).

With regard to the standardized coefficients, satisfaction ($\beta = 0.28$, $p < 0.01$), willingness ($\beta = 0.15$, $p < 0.01$), and digital platform ($\beta = 0.16$, $p < 0.01$) are all significant predictors of advocacy, indicating their moderation between co-creation and advocacy (Table 5) and accounting for the non-significant path coefficient in the structural analysis.

Table 4. Correlation Matrix for Advocacy.

		Mean	SD	1	2	3	4	5	6
1	Advocacy	11.9	1.9						
2	Co-creation	21.7	7.1	0.133 **					
3	Willingness	15.7	2.9	0.341 **	0.074				
4	Satisfaction	8.1	1.4	0.398 **	−0.011	0.402 **			
5	Digital Platform	24.5	6.1	0.173 **	0.511 **	−0.016	0.016		
6	Experience	23.8	6.3	0.308 **	0.250 **	0.172 **	0.134 **	0.189 **	
7	Ability	11.4	2.2	0.286 **	0.055	0.442 **	0.305 **	0.002	0.116 **

SD = Standard Deviation; ** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed).

Table 5. Summary of Hierarchical Regression Analysis for Variables predicting Advocacy ($N = 407$).

Variable	B	SE B	β
Step 1			
Co-creation	0.01	0.01	0.04
Willingness	0.14	0.03	0.22 **
Satisfaction	0.43	0.07	0.31 **
Digital Platform	0.50	0.02	0.15 **
Step 2			
Co-creation	0.01	0.01	−0.01
Willingness	0.10	0.03	0.15 **
Satisfaction	0.38	0.07	0.28 **
Digital Platform	0.04	0.02	0.13 **
Experience	0.06	0.01	0.21 **
Ability	0.09	0.04	0.11 **

Note. $R^2 = 0.23$ for step 1 ($p < 0.01$); $R^2 = 0.05$ for step 2 ($p < 0.05$); ** $p < 0.01$; * $p < 0.05$.

5.3.2. Moderator Effect on Attitude

The correlation between attitude and the confounding variables is presented in Table 6. Customer satisfaction has the strongest relationship with attitude ($r = 0.511$, $p < 0.01$), followed by advocacy ($r = 0.404$, $p < 0.01$) and willingness ($r = 0.392$, $p < 0.01$). The correlation between co-creation and digital platform and between experience and co-creation remain as strong as in the case of advocacy. Thus the results indicate the effect of digital platform and willingness on co-creation and attitude, and that attitude positively relates to advocacy. The model summary indicates that block 1 predictors explain 37 percent of variance in attitude ($R^2 = 0.369$, Sig. F Change = 0.000), while predictors in block 2 explain 1 percent of variance in attitude which is also significant ($R^2 = 0.012$, Sig. F Change = 0.036). The ANOVA result was also significant ($p = 0.000$) in both blocks of predictors. The path coefficients demonstrate satisfaction and advocacy are strong predictors of attitude. Willingness and digital platform are also predictors of attitude. However, the relations between digital platform and attitude is negative, though the impact of digital platform on attitude is significant ($\beta = -0.17$, $p = 0.000$) as shown in Table 7.

Table 6. Correlation Matrix for Attitude.

	Mean	SD	1	2	3	4	5	6	7
1 Attitude	8.1	1.5							
2 Co-creation	21.7	7.1	−0.001						
3 Willingness	15.7	2.9	0.392 **	0.074					
4 Satisfaction	8.1	1.4	0.526 **	−0.011	0.402 **				
5 Digital Platform	24.5	6.1	−0.106	0.511 **	−0.061	0.016			
6 Advocacy	11.9	1.9	0.404 **	0.133 **	0.341 **	0.398 **	0.173 **		
7 Experience	23.8	6.3	0.045	0.250 **	0.172 **	0.134 **	0.189 **	0.308 **	
8 Ability	11.4	2.2	0.297 **	0.055	0.442 **	0.305 **	0.002	0.286 **	0.116 **

SD = Standard Deviation; ** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed).

Table 7. Summary of Hierarchical Regression Analysis for Variables predicting Attitude ($N = 407$).

Variable	B	SE B	β
Step 1			
Co-creation	0.01	0.01	0.05
Willingness	0.08	0.02	0.16 **
Satisfaction	0.41	0.05	0.38 **
Digital Platform	−0.04	0.01	−0.17 **

Table 7. Cont.

Variable	B	SE B	β
Advocacy	0.18	0.04	0.22 **
Step 2			
Co-creation	0.01	0.01	0.07
Willingness	0.07	0.02	0.14 **
Satisfaction	0.40	0.05	0.37 **
Digital Platform	−0.04	0.01	−0.17 **
Advocacy	0.19	0.04	0.24 **
Experience	0.02	0.01	−0.10
Ability	0.04	0.03	0.06

Note: $R^2 = 0.36$ for step 1 ($p < 0.01$); $R^2 = 0.05$ for step 2 ($p < 0.05$), ** $p < 0.01$, * $p < 0.05$.

6. Discussion and Conclusions

The main objective of this study was to examine the effects of value co-creation in the solid waste collection industry from the customer perspective. The study adopted marketing approach to sanitation through building stronger enterprise-customer relationships through the digital platform in a form of co-creation, since enterprises are not unilaterally responsible for the value of their market offerings [54]. In this regard, we examined the relationship between the customer's intangible resources (experience and ability (skills), co-creation, attitude and advocacy. We also examined the moderating effects of willingness, customer satisfaction and digital platform on the above relationships. The majority of extant literature reviewed on co-creational behaviors had not considered the moderating impact of the quality and user-friendliness of the enterprise's digital platform on attitude and advocacy. This study considered it.

All but three of the ten hypotheses for the main hypothesized constructs were confirmed. Those relationships found not significant were explained by the presence of confounding variables. Attitude change and online advocacy are moderated by customer satisfaction, customer willingness to co-create and to advocate, and the presence and quality of the firm's digital platforms. Thus nature and type of digital platform being operated by the enterprise affects the relationship between customer experience and co-creation and that of co-creation and attitude and advocacy. The descriptive statistics analysis indicates that customers of the waste firms have an average online co-creation or interactions with the firms. The path analysis also indicates non-significance impact of co-creation on attitude and advocacy. Though this is at variance with similar co-creation studies such as [13], the variance is explained by the influence of customer satisfaction, the willingness of the customer to co-create and the availability and friendliness of appropriate digital platforms. In addition to this, this study considered experience and ability, two key customer operant resources, as the independent variables and co-creation as the mediator compared to studies like [52] which had co-creation as the main independent variable and customer satisfaction as a mediator. However, as shown by the moderator assessment, customer satisfaction positively moderates the relationship between co-creation and advocacy (word-of-mouth) and attitude. This agrees with results in [52] and [44] which showed a positive impact of customer satisfaction on word of mouth.

The results clearly demonstrate the profound impact of customer satisfaction on the relationship between co-creation and attitude and advocacy. Willingness to co-creation was also found to moderate customer co-creation activities in line with results from similar studies [56]. Further, customer satisfaction impacts customer willingness to co-create.

The outcome of this study has implications for waste management firms in Ghana and other developing countries. To the best of our knowledge, this is first study on the application of digital value co-creation to solid waste management in Ghana. Given that online co-creation in the solid waste industry is not well entrenched in Ghana, this study will serve as a foundational work for subsequent studies on the subject matter in Ghana. The results would also greatly contribute to enhancing the

design and implementation of future online co-creation activities between enterprises and customers in Ghana, particularly in the waste sector. The research would also set the pace for interest for online co-creation studies in the solid waste industry in Ghana and Africa.

Given the outcome of this study, private waste enterprises in Ghana stand to gain by adopting technology (particularly social media) to the management of their stakeholder interactions in order to be competitive. In this regard, this study has highlighting the key variables that have to be considered in the design of an online co-creation ventures, key among them is the building of user-friendly, information rich digital platforms as well as Apps for customer interface. This is to address the issue of lack of credible information on the benefits of households and customers investing their resources in preventive behaviors [39].

Further to the afore-mentioned is the need to create awareness among the firm's stakeholders of the existence of such platforms, and to adopt motivational strategies to drive traffic unto the platforms. Employees who come into contact with customers should be trained for effective interaction with customers and other stakeholders online. Similarly, solid waste firms need to pay more attention to customer satisfaction as it greatly impacts the willingness of customers to fully participate in online co-creation activities. Formation of environmentalist groups in neighborhoods and schools by the waste firms should be given serious considerations.

Opinion leaders could be appointed to lead and to influence these groupings. Facilitating internet access to the poor households to reinforce their attitude towards better waste separation and recycling would be a good investment. For online co-creation projects to succeed, project supporters should be built before implementation, as well as developing a comprehensive understanding of causes of opposition to "Not In My Backyard" (NIMBY) attitude, and acting to remove them through stakeholder consultation, correction of misinformation, and compromise, using the numerous social media platforms together with the traditional media outlets, and the community face-to-face interactions [28]. Furthermore, the communication of the health benefits of proper environmental management and participation in value co-creation should be intensified by the waste firms.

Like any other research study, this research is not an exception. Firstly, this study only considered the customer as the co-creator. However, solid waste management involves a myriad of stakeholders such as municipal councils, opinion leaders, government agencies, nonprofit organizations, among others. Secondly, gender was not considered as a key determining variable, despite the key role gender plays in waste management in Africa. Further to this, non-users of social media, many of whom tend to be women [26], were not considered. These two factors would be considered by future research.

Future studies should also consider the effects of motivation, gender, education of customers and the availability and cost of adoption of new technologies by the average Ghanaian on online co-creation. In addition, the proposed model should be expanded to include other equally important stakeholders like municipal councils and broader employee types, and how their combined experiences and skills would impact co-creation behaviors. Furthermore, sample size for future studies should include households from all the ten administrative regions of Ghana in order to generalize the results for the entire country.

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Appendix A

Table A1. Final Measurement Items.

Constructs	
<i>Experience (EP) Source: Yip (2011)</i> (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)	
EP5	My current co-creation experience is about participating in online discussions and interacting with other stakeholders of a service firm.
EP6	My current co-creation experience is about participating in online discussions and interacting with employees of the firm.
EP7	My online current co-creation is about gaining knowledge by interacting with the firm.
EP8	My current online co-creation experience is about gaining knowledge by interacting with other customers.
EP9	My current online experience is about gaining knowledge by interacting with the employees of my service providers.
EP10	My current online experience is about being able to challenge the firm on issues that are important to me.
EP11	My current co-creation experience is about sharing my resources (skills and knowledge) with my service providers online.
<i>Ability (AB) Source: Authors</i> (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)	
AB1	I am capable of engaging with my service provider online.
AB2	I have extensive skills in online transactions/collaborations.
AB3	I am highly computer literate.
<i>Co-creation (CC) Source: Authors</i> (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)	
CC1	I often visit the website and social media platforms of my solid waste collection service provider.
CC2	I collaborate with my solid waste collection service provider online to co-create services.
CC3	I often interact and discuss waste issues with other customers of the solid waste firm online
CC4	I often interact and discuss waste issues with the employees of my solid waste service provider online.
CC5	I often interact and discuss waste issues with other stakeholders of the waste firm like the metropolitan/municipal/district assemblies online.
CC6	I share relevant information online with my solid waste collection service provider for an improved service.
CC7	I share relevant information for improved service provision with my waste firm online because I trust the firm.
CC8	I provide online reviews to the services of the firm.
<i>Attitude (AT) Source: Authors</i> (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)	

Table A1. Cont.

Constructs	
AT1	Customer attitude towards the firm and its sanitation programs would always be positive when the customer is actively engaged in service design and provision by the firm.
AT2	My attitude towards the firm and its programs would be positive when I am actively engaged in service design by the waste firm.
<i>Advocacy (AD) Source: Authors</i> (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)	
AD2	I would recommend or advertise my solid waste service provider and their sanitation programs to others when I am actively involved in co-creation.
AD3	I would provide regular online review of the firm's services to positively influence actual and potential customers' attitude towards the firm.
AD4	I would encourage friends and family to visit the firm's social media platforms to like, follow and offer reviews/ideas to the firm.
Moderators	
<i>Willingness (WL) Source: Authors</i> (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)	
WL1	I am willing to actively engage solid waste management firms in solving sanitation problems.
WL2	I am willing to collaborate with other stakeholders of solid waste firms to create superior value.
WL3	I would be comfortable collaborating with my solid waste collection service provider and other stakeholders if I trust the digital platform.
WL4	I am willing to disclose personal information online to my solid waste collection service provider in order to create better services.
<i>Customer Satisfaction Source: Authors</i> (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)	
CS2	Regular online interaction and co-creation with my solid waste collection service provider would increase my satisfaction.
CS3	Active customer participation in service design leads to higher customer satisfaction.
<i>Digital Platform (DG) Source: Wang and Tang (2001), authors</i> (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree)	
DG1	The waste firm's website/social media platforms provide comprehensive information on services and programs.
DG2	The waste firm's website/social media platforms provide accurate information.
DG3	The waste firm's website/social media platforms provide up-to-date information.
DG4	The waste firm's website/social media platforms provide information that I trust.
DG5	The waste firm's website/social media platforms are user-friendly.
DG6	The waste firm's website/social media platforms provide convenient search engines for finding product and service reviews.
DG7	The waste firm's website/social media platforms provide an engagement platform for generating and sharing of ideas among the stakeholders.
DG8	The waste firm's website/social media platforms provide an instructional guide on how to participate in co-creation.

References

1. Reymond, P.; Renggli, S.; Lüthi, C. Towards Sustainable Sanitation in an Urbanising World. In *Sustainable Urbanization*; IntechOpen: London, UK, 2016.
2. World Population Prospects. Available online: https://esa.un.org/unpd/wpp/publications/files/wpp2015_methodology.pdf (accessed on 20 July 2018).
3. Ziraba, A.K.; Haregu, T.N.; Mberu, B. A review and framework for understanding the potential impact of poor solid waste management on health in developing countries. *Arch. Public Health* **2016**, *74*, 1–11. [CrossRef] [PubMed]
4. Miezah, K.; Obiri-Danso, K.; Kádár, Z.; Fei-Baffoe, B.; Mensah, M.Y. Municipal solid waste characterization and quantification as a measure towards effective waste management in Ghana. *Waste. Manag.* **2015**, *46*, 15–27. [CrossRef] [PubMed]
5. Ghana Living Standards Survey Round 6 (GLSS 6). Available online: http://www.statsghana.gov.gh/docfiles/glss6/GLSS6_Main%20Report.pdf (accessed on 19 July 2018).
6. Marshall, R.E.; Farahbakhsh, K. Systems approaches to integrated solid waste management in developing countries. *Waste Manag.* **2013**, *33*, 988–1003. [CrossRef] [PubMed]
7. Sustainable Development Solutions Network. *Getting Started with the Sustainable Development Goals: A Guide for Stakeholders*; Sustainable Development Solutions Network: Paris, France, 2015.
8. United Nations General Assembly, 65th Session. Available online: <http://journals.cambridge.org/production/action/cjoGetFulltext?fulltextid=5029264> (accessed on 28 March 2018).
9. The Millennium Development Goals Report 2015. Available online: http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20Summary%20web_english.pdf (accessed on 28 March 2018).
10. Oduro-kwarteng, S.; van Dijk, M.P. The effect of increased private sector involvement in solid waste collection in five cities in Ghana. *Waste. Manag. Res.* **2013**, *31*, 81–92. [CrossRef] [PubMed]
11. McColl-Kennedy, J.R.; Vargo, S.L.; Dagger, T.S.; Sweeney, J.C.; van Kasteren, Y. Health Care Customer Value Cocreation Practice Styles. *J. Serv. Res.* **2012**, *15*, 370–389. [CrossRef]
12. Prahalad, C.K.; Ramaswamy, V. Co-opting Customer Competence. *Harv. Bus. Rev.* **2000**, *78*, 79–87.
13. McColl-Kennedy, J.R.; Hogan, S.J.; Witell, L.; Snyder, H. Cocreative customer practices: Effects of health care customer value cocreation practices on well-being. *J. Bus. Res.* **2017**, *70*, 55–66. [CrossRef]
14. Wilson, D.C. Development drivers for waste management. *Waste Manag. Res.* **2007**, *25*, 198–207. [CrossRef] [PubMed]
15. Nunes, A.R.; Lee, K.; O’Riordan, T. The importance of an integrating framework for achieving the Sustainable Development Goals: the example of health and well-being. *BMJ Glob. Health* **2016**, *1*, 1–12. [CrossRef] [PubMed]
16. Duru, C.B.; Iwu, A.C.; Diwe, K.C. Environmental Sanitation Practices: A Case Study of Solid Waste Management in Semi-Urban Communities in Orlu, Imo State Nigeria. *Occup. Dis. Environ. Med.* **2017**, *5*, 88–105. [CrossRef]
17. World Health Organization (WHO) (2017) Sanitation Fact Sheet. Available online: <http://www.who.int/mediacentre/factsheets/fs392/en/> (accessed on 28 March 2018).
18. Sievers, D.; Kelly, G. *Evidence Series: Market-Based Approaches to Sanitation*; Population Services International: Washington, DC, USA, 2016.
19. Gyrd-Jones, R.I.; Kornum, N. Managing the co-created brand: Value and cultural complementarity in online and offline multi-stakeholder ecosystems. *J. Bus. Res.* **2013**, *66*, 1484–1493. [CrossRef]
20. Overcoming NIMBY Opposition to Developing New Affordable Housing. Available online: http://www.kineticis.com.au/wp-content/uploads/2011/09/WhitePaper_OvercomingNIMBYOpposition-Jan2012.pdf (accessed on 28 March 2018).
21. World Bank. *Sanitation Marketing Lessons from Cambodia: A Market-Based Approach to Delivering Sanitation*; The World Bank Group: Washington, DC, USA, 2012.
22. Addressing the Sanitation Crisis through a Market-Based Approach. Available online: <http://wedc.lboro.ac.uk/resources/conference/40/Akwunwa-2820.pdf> (accessed on 28 March 2018).
23. Sanitation as a Business. Available online: http://akvopedia.org/wiki/Sanitation_as_a_Business#mw-head (accessed on 28 March 2018).
24. Chang, N.-B.; Pires, A.; Martinho, G. Empowering Systems Analysis for Solid Waste Management: Challenges, Trends, and Perspectives. *Crit. Rev. Environ. Sci. Technol.* **2011**, *41*, 1449–1530. [CrossRef]

25. Ramaswamy, V.; Ozcan, K. Brand value co-creation in a digitalized world: An integrative framework and research implications. *Int. J. Res. Mark.* **2016**, *1*, 93–106. [[CrossRef](#)]
26. Frempong, J.; Chai, J. Technology, digital brand value co-creation, women and solid waste management in Africa: A conceptual discourse. In Proceedings of the 2017 International Conference on Public Administration (12th) & International Symposium on West African Studies (1st), Accra, Ghana, 14–17 November 2017; UESTC Press: Chengdu, China, 2017; pp. 908–923.
27. Oduro-Kwarteng, S. *Private Sector Involvement in Urban Solid Waste Collection*; CRC Press/Balkema: Leiden, The Netherlands, 2011.
28. Making Waste Work: Community Waste Management Toolkit. Available online: <https://wasteaid.org.uk/toolkit/> (accessed on 5 July 2018).
29. Vargo, S.L.; Lusch, R.F. Evolving to a New Dominant Logic for Marketing. *J. Mark.* **2004**, *68*, 1–17. [[CrossRef](#)]
30. Prahalad, C.K.; Ramaswamy, V. Co-creation experiences: The next practice in value creation. *J. Interact. Mark.* **2004**, *18*, 5–14. [[CrossRef](#)]
31. Tauscher, K. Leveraging collective intelligence: How to design and manage crowd-based business models. *Bus. Horiz.* **2017**, *60*, 237–245. [[CrossRef](#)]
32. Madhavaram, S.; Hunt, S.D. The service-dominant logic and a hierarchy of operant resources: Developing masterful operant resources and implications for marketing strategy. *J. Acad. Mark. Sci.* **2008**, *36*, 67–82. [[CrossRef](#)]
33. Penrose, E.T. *The Theory of the Growth of the Firm*; Basil Blackwell and Mott.: London, UK, 1959.
34. Gao, Q.; Feng, C. Branding with social media: User gratifications, usage patterns, and brand message content strategies. *Comput. Hum. Behav.* **2016**, *63*, 868–890. [[CrossRef](#)]
35. File, K.; Valente, T.; Mclaws, M. Hygiene and Health: Who Do Mothers in Vanuatu Communicate with about Health? *Int. J. Environ. Res. Public Health* **2018**, *15*, 443. [[CrossRef](#)] [[PubMed](#)]
36. Whitby, M.; Pessoa-Silva, C.L.; McLaws, M.-L. Behavioural considerations for hand hygiene practices: The basic building blocks. *J. Hosp. Infect.* **2018**, *65*, 1–8. [[CrossRef](#)] [[PubMed](#)]
37. Pillay, C.; van den Bergh, J. Human health impacts of climate change as a catalyst for public engagement. *Int. J. Clim. Chang. Strateg. Manag.* **2016**, *8*, 578–596. [[CrossRef](#)]
38. Shrestha, R.; Flacke, J.; Martinez, J.; van Maarseveen, M. Interactive cumulative burden assessment: Engaging stakeholders in an adaptive, participatory and transdisciplinary approach. *Int. J. Environ. Res. Public Health* **2018**, *15*, 260. [[CrossRef](#)] [[PubMed](#)]
39. Dupas, P. Health Behavior in Developing Countries. *Annu. Rev. Econom.* **2011**, *3*, 1–39. [[CrossRef](#)]
40. Thornton, B.R.L. The Demand for, and Impact of, Learning HIV Status. *Am. Econ. Rev.* **2008**, *98*, 1829–1863. [[CrossRef](#)] [[PubMed](#)]
41. Kaplan, A.; Haenlein, M. Collaborative projects (social media application): About Wikipedia, the free encyclopedia. *Bus. Horiz.* **2014**, *57*, 617–626. [[CrossRef](#)]
42. Martini, A.; Massa, S.; Testa, S. Customer co-creation projects and social media: The case of Barilla of Italy. *Bus. Horiz.* **2014**, *57*, 425–434. [[CrossRef](#)]
43. Relling, M.; Schnittka, O.; Sattler, H.; Johnen, M. Each can help or hurt: Negative and positive word of mouth in social network brand communities. *Int. J. Res. Mark.* **2016**, *33*, 42–58. [[CrossRef](#)]
44. Serenko, A. Student satisfaction with Canadian music programmes: The application of the American Customer Satisfaction Model in higher education. *Assess. Eval. High Educ.* **2011**, *36*, 281–299. [[CrossRef](#)]
45. Taute, H.A.; Sierra, J.J.; Carter, L.L.; Maher, A.A. A sequential process of brand tribalism, brand pride, and brand attitude to explain purchase intention: a cross-continent replication study. *J. Prod. Brand. Manag.* **2017**, *26*. [[CrossRef](#)]
46. Dotson, J.P.; Fan, R.R.; Feit, E.M.D.; Oldham, J.D.; Yeh, Y.H. Brand Attitudes and Search Engine Queries. *J. Interact. Mark.* **2017**, *37*, 105–116. [[CrossRef](#)]
47. Vanwesenbeeck, I.; Walrave, M.; Ponnet, K. Children and Advergaming: the role of product involvement, prior brand attitude, persuasion knowledge and game attitude in purchase intentions and changing attitudes. *Int. J. Advert.* **2016**, *048*, 1–22. [[CrossRef](#)]
48. Sanitation and Hygiene Approaches. Available online: www.wateraid.org/technologies (accessed on 28 March 2018).
49. Padilla, A.J.; Trujillo, J.C. Waste disposal and households' Heterogeneity. Identifying factors shaping attitudes towards source-separated recycling in Bogotá, Colombia. *Waste Manag.* **2018**, in press. [[CrossRef](#)] [[PubMed](#)]

50. Cooil, B.; Keiningham, T.L.; Aksoy, L.; Hsu, M. A Longitudinal Analysis of Customer Satisfaction and Share of Wallet: Investigating the Moderating Effect of Customer Characteristics. *J. Mark.* **2007**, *71*, 67–83. [[CrossRef](#)]
51. Hudson, S.; Huang, L.; Roth, M.S.; Madden, T.J. The influence of social media interactions on consumer-brand relationships: A three-country study of brand perceptions and marketing behaviors. *Int. J. Res. Mark.* **2016**, *33*, 27–41. [[CrossRef](#)]
52. Cambra-Fierro, J.; Pérez, L.; Grott, E. Towards a co-creation framework in the retail banking services industry: Do demographics influence? *J. Retail. Consum. Serv.* **2017**, *34*, 219–228. [[CrossRef](#)]
53. Yip, K.T. The Attributes of Value Co-Creation in Service and Its Impact on Customers' Willingness to Pay. Observations from Three Service Industries. Ph.D. Thesis, University of Exeter, Cornwall, UK, 2011.
54. Wang, Y.; Tang, J.E. An instrument for measuring customer satisfaction toward web sites that market digital products and services. *J. Electron Commer Res.* **2001**, *2*, 89–102.
55. Ghana Statistical Service. *2010 Population and Housing Census*; Ghana Statistical Service: Accra, Ghana, 2013.
56. Neghina, C. Consumer motives and willingness to co-create in professional and generic services. *J. Serv. Manag.* **2017**, *28*, 157–181. [[CrossRef](#)]



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