Exploring social value and their enablers as business models for sustainable water supply projects

Abstract

Purpose - This work aims to understand how social value is created and delivered using community-based water supply projects. It examines social value creation given the enabling concepts - value co-creation and service ecosystems as business models for infrastructure.

Design/methodology/approach - Inductive reasoning, including qualitative research design, was applied to two water supply projects. The qualitative stage created social value co-creation features using the purposive sampling of 72 semi-structured interviews analysed using NVIVO 11.

Findings - The qualitative analysis features social value co-creation, which includes a sense of social unity, end-user empowerment, Behavioural transformation, and knowledge transfer. Although value destruction also emerged while examining social value co-creation, we remark on the “red flags” and value contradictions that must be avoided.

Originality - The work offers a widened perspective of social value creation and a new framework called "Social value co-creation/destruction "(SNVCC/SNVCD) as the business model for sustainable infrastructure projects. It is the first attempt to illustrate social value creation in construction from service ecosystems and value co-creation perspectives.

Research implications - Enablers of sustainable infrastructure projects should include social value, service ecosystems and value co-creation.

Practical implications - There is a need for the government and non-governmental organisations to create enabling platforms that involve a planned dialogical communication process supporting the development and enhancement of relationships of stakeholders for social value co-creation in infrastructure projects.

1.1 Introduction

Infrastructure is crucial for the social prosperity of society. Infrastructure aims to meet fundamental societal needs, such as roads, public transport, low-carbon energy supply, clean water and flood protection (Fitton and Moncaster, 2021). Several large infrastructure projects are also critical for the future of society due to their intergenerational nature and long lifespan. Infrastructure is to deliver broader social outcomes, not just engineering outputs. The societal benefits that infrastructure can generate are more comprehensive than delivering basic functionality. Infrastructure projects can create additional 'social value' (ICE, 2020). Therefore, understanding the social value of infrastructure is essential to delivering a socially successful and technically successful project.

The problem, therefore, exists that despite infrastructure having the potential to play a transformative role in creating social value, current outcomes could be more effective (ICE, 2020). This is because the study of social value has been primarily considered in the procurement and construction phases of the project - mostly because procurement is the focus of the Social Value Act (2012). However, research on how social value is created at different stages of the project's life cycle, from planning, design, procurement, delivery,

and operations and decommissioning, needs to be revised. Specifically, the study on how social value, including the specific enabling concepts for creation, is exceptionally scarce.

Therefore, this work demonstrates how social value is created by considering the interconnection with the enabling concepts of value co-creation and service systems. This should provide an appreciation of investigating social value creation strategies and enhance the delivery of sustainable development projects using sustainable business models. Studying an all-inclusive approach to social value creation in infrastructure is much needed for sustainability within the infrastructure sector.

Social value creation in infrastructure projects is considered here through the lens of value co-creation" on the "service ecosystems" premise. Thus, explores the question - What are the features of social value co-creation in water supply service systems? The following sections discuss the literature on social value, including the enabling concepts – service ecosystems and value co-creation. The case regions' descriptions and data collected, including analysis and discussion, are engaged in detail.

2.1 Literature review

2.1.1 Social value

The literature on social value suggested no single definition of social value. Opoku and Guthrie (2018) argued that defining social value is as tricky as delivering, measuring, and recognising communities' social, environmental, and economic impacts. The authors define social value as above and beyond the direct service delivery and created when resources, inputs, processes or policies are combined to generate improvements in the lives of individuals or society as a whole (Raiden et al. 2019). Social value is taken from the user's perspective and role in managing natural resources such as water supply. It provides the basic building blocks to increase equality, improve well-being and increase environmental sustainability (Opoku and Guthrie, 2018). Creating social value can improve people's lives in our communities, provide career and skills development opportunities and positively contribute to the environment. Social value refers to creative and resourceful responsiveness to addressing social issues. It broadens the appreciation of value beyond economic terms. It may thus be defined as the social impact that any organisation, project or programme of work makes on the lives of the stakeholders affected by its activities (Raiden and King, 2021).

Social value can and should be about rethinking community-based projects are delivered and the use of scarce natural resources. The delivery of social value to the community should inevitably involve working with various actors to address societal needs. However, adequate involvement of the broader community in the development of infrastructure projects is crucial for doing it right and making it happen in societal contexts (Doloi, 2020) and needs adequate investigation. Besides, extensive work on social value has been at the procurement and construction phases of the project - mostly because procurement is the focus of the

Social Value Act (2012). Therefore, there is an urgent need to explore guidance on delivering meaningful social value in the infrastructure sector. In addition to this inadequacy is the lack of the structure of responsibility and leadership in social value study.

2.1.2 Service ecosystems (SEs)

Service abounds everywhere (Vargo et al., 2017), forming an "ecosystem" with actors, energy flow and environmental interactions (Vargo and Lusch, 2015). More specifically, the term "service ecosystem" is used to identify a flow in service provision (Vargo and Lusch, 2015) and the "configuration of people, technology, and other resources that interact with other service systems to create mutual value (Maglio et al., 2009, p.395). Value is co-created by joint efforts among organisations, end-users, and other actors (Vargo and Lusch, 2015). The actors in the SEs are joined mutually by value co-creating efforts, therefore creating self-organising, self-adjusting SEs. Actors compromise, behave appropriately and attach meaning by interacting within a shared system. Value propositions are both influenced by and influence social systems and local interactions. In this view, value co-creation happens within a service ecosystem (Siltaloppi and Vargo, 2014). Social value has a dynamic nature. The end-user continuously receives and appraises it in an ecosystem that is the venue for the service exchange (Shoji et al., 2019). It is embedded in social interaction and requires the resource integration practices of multiple actors (Peters, 2016). Nevertheless, assisting project developers and researchers in understanding value co-creation more comprehensively (Akaka et al., 2013) in water supply projects has been seldom studied.

2.1.3 Value co-creation

The term "value co-creation" was coined to denote the production of value that occurs through interaction between an organisation and a consumer (Ojuri et al., 2018). The concept stresses that the provider and consumer hold similar roles to generate value, integrate resources and apply competencies to collaborate based on trust, continuous interactions, engagement, and adequate knowledge exchange to enhance and maximise benefits for project participants (Rojas, Liu and Lu, 2017). Value co-creation requires resource integration - where actors share their resources complementarily, distinctive competencies and linked interests. The resources are integrated and reciprocally accessed through interaction for the benefit of others (Siltaloppi and Vargo, 2014). The concept has been widely adopted to evaluate the management of projects (Chang et al., 2013, Smyth et al., 2018). Value co-creation application in project management includes the effects of conflicts on value co-creation in project actors' relationships (Ojuri et al., 2018, Ojuri et al., 2019). It can potentially lead to value destruction (Mills and Razmdoost, 2016; Smyth et al., 2017). However, it can enhance sustainable development and deliver benefits to a broad range of beneficiaries (Keeys and Huemann, 2017; Rojas et al., 2018). Esan-Ojuri and You (2021) highlight the importance of social value co-creation and moving beyond directly purchasing goods.

2.1.4 Social value co-creation

Value co-creation should be appreciated in a social context; thus, the involvement of several stakeholders should be present in the system (Agrawal et al., 2015). Social value co-creation is the engagement of various stakeholders in a service system to the evolution of social value for all the stakeholders involved in the value co-creating system. This work primarily focuses on social value through co-creation. Social value co-creation occurs when institutions are put in place to ensure that resources and contributions of stakeholders are combined to generate improvements in the lives of individuals, groups or communities, or society as a whole (Raiden and King, 2021). Co-creation of social value has emerged as the most recent and dynamic phenomenon in management and bulti environment literature, thus, making it timely for exploration as a business model for water infrastructure project delivery.

2.1.5 The conceptual intersection of social value, service ecosystems and value co-creation

Social value, service ecosystems (SEs) and value co-creation are solidified into a single framework in Figure 1. The Figure represents how sustainable water resource management can be holistically achieved from the institution of "service ecosystems" consisting of project providers, consumers, and a diverse range of multi-actors. Meanwhile, the "value co-creation" concept manifests in a "service ecosystem" through interactions between the project provider and consumer to jointly produce value. This work supports studies in sustainable resource management to refocus attention on societal systems, management concepts and practices that can advance the policies, institutions, and technology towards more sustainable management of natural resource projects. This conceptual representation in Figure I illustrates that sustainable management of water resource projects can be successful when projects are social value-creation driven, however, in the presence of management practices such as service ecosystems and value co-creation.

Figure I: Conceptual Framework

The conceptual framework above is to provide a coherent argument about why the variables in this work matter and why the methodology adopted is appropriate.

3.1 Methodology

3.1.1 Research design

This research adopts the constructivist approach based on Zelić and Stahl (2005) established on the result of the human action of perception, which constitutes the phenomena under investigation. Interpretive epistemology is mainly qualitative. Qualitative research is an approach to investigating and understanding the meaning individuals and groups ascribe to a social or human problem (Creswell and Plano, 2011). A

case study was adopted as a research approach to understand specific issues alongside qualitative. The primary qualitative data is semi-structured interviews.

3.1.2 Qualitative data collection process

Data was collected from two community-based water projects. The system adopted for the delivery of the water project is called "KAMOMI". KAMOMI is a community-based water supply system developed and delivered by the government agency called "Rural Water Supply and Sanitation Agency" – RUWASAN, although with the collaboration of the United Nations Children's Fund (UNICEF) and the Japan International Cooperation Agency (JICA). KAMOMI promotes community ownership of water facilities, water provision and maintenance by the integrative efforts of the community people and the provider to sustain the functionality of the water facilities to address the community's social needs. During the commissioning of water projects under KAMOMI, the water project is handed over to the stakeholders for operation and maintenance, albeit selected stakeholders would have been trained to acquire the necessary skills for operation and minor maintenance of the water projects after commissioning. Meanwhile, the provider in contacted for significant repairs and maintenance. The water service system in case study I is called "WASHCOM - Bolorunduro". Similarly, in case study II is called "WASHCOM – Araromi". There were thirty-six members in each WASHCOM which consisted of, Maintenance officer, Coordinator, Assistant Coordinator, Secretary, Assistant Secretary, Treasurer, Financial Secretary, Electrician, Technician, Operator, including twenty-six water points representatives. Both water projects in case studies I and II were delivered through KAMOMI system, hence the same number of WASHCOM members. Therefore, there were thirty-six interviews from WASHCOM members, making seventy-two respondents for both case studies.

The sampling technique for this work's data collection was purposive sampling. First, the justification for adopting the sampling technique was based on collecting data from respondents exceptionally knowledgeable about this work's aim. Second, the enabling concepts of social value - value co-creation and service system could realistically be examined from a communal water supply system. Additionally, the delivery of the water supply project under KAMOMI system was designed to involve the end-users, including the water project provider, to collaboratively ensure the provision of social needs by the community water supply system.

Data collection was made possible because the author made several visits and consultations to attend the WASHCOM weekly meetings for data collection purposes. During data collection periods, the attendance of thirty-six respondents in each case region was compulsory at weekly meetings. The author gave an

introduction and a complete description of the elements under investigation. Based on approval, the interviews were collected in the town hall immediately after the community meetings on Saturdays. Each Saturday, the participants to be interviewed were given numbers and an approximate allotted schedule. This was necessary for a well-organised data collection exercise and also to make it flexible for participants who wished to engage in a few chores before their allotted schedule. Overall, there was an average time of forty-five minutes for each interview. Thus, eight respondents were interviewed per Saturday, which translates to approximately seven hours each Saturday. The author's paper-based interview guide followed the one-to-one conversation, recorded in a SONY Digital voice recorder. To cover the seventy-two respondents in both case regions, the data collection period of interviews for case studies I and II took place in May/June and October/November 2019, respectively.

4.1 Data analysis and findings

The analysis started after all the interviews were transcribed while also fully considering the work's objectives. First, thematic analysis was used to analyse the data (Guest, 2012) using NVIVO-11 software. Second, initial codes were generated to capture the data's essential features (value co-creation and value destruction features). See table I. The nodes were the recurring patterns (themes) across the data developed during this familiarisation. Third, after all the data were coded and highlighted, all the relevant extracts nodes were collated and examined to identify broader patterns of meaning (themes). Finally, all the relevant information was organised under these nodes after developing the data's potential nodes.

Furthermore, these nodes were refined, organised, and categorised meaningfully into sub-nodes (sub-themes) through the iterative process. For instance, the researcher categorised the positive responses regards social value co-creation into social value co-creation nodes. In contrast, negative responses were categorised into the social value co-destruction node. See Table I for the codes/theme's categorisation.

Table I: Themes categorisation

The analysis of case studies I and II uncovered seven features of social value co-creation. The features are compiled in Table II were generated during the analysis of the interviews.

Table II: Summary of features of social value co-creation in case regions I and II from the analysis

In Table II, features of social value co-creation in case region I were also discovered in case region II, which included resource integration, end-user empowerment and knowledge transfer. Meanwhile, other features

unearthed in case region I that were not discovered in case II were the Sense of social unity, behavioural transformation, and value-in-context defined value. Meanwhile, features of social value co-destruction in both case regions are indicated in Table III.

Table III: Summary of features of social value co-destruction in case regions I and II from the analysis

The following section interprets and describes the importance of qualitative findings concerning the research problem under investigation, including the highlights of new findings.

5.1 Discussions

5.1.1 The features of social value co-creation in case regions I and II

5.1.1.1 Resource integration is a significant factor for sustainable management of water resource

The strategy to achieve sustainability of the community water project was developed in both case studies as an establishment of SEs consisting of multi-actors, reinforced by four pillars: community development, access to water, well-being and environmental sustainability. Furthermore, resource integrators (Actors in SEs) jointly contributed their resources to benefit the community. Therefore, different resource integrators within the water service system play specific and crucial roles in ensuring the sustainable management of the water project. Below is the remark of the secretary of Bolorunduro WASHCOM.

> ***"Because if the water project breaks down, we need money to make it work again. It is when we put all our resources together in the community, whether money, technical or to manage it, that will make the water project continue to work for us all" (Secretary - case region I)***

In providing a sustainable water supply to the community by WASHCOM, tangible and intangible resources were combined. The former is the water facility and underground water. At the same time, the latter are knowledge, money, time, leadership and communication skill provided by the provider, actors, and end-users of the service systems for the water projects. The qualitative feedback revealed that the end-users understood that integrating their resources, such as financial contributions and the time spent in community meetings, was necessary for the water supply provision, which is part of the value they receive. Resource integration in the water service system involves the involvement of community people during the project lifecycle for sustainability. This strategy has yet to be empirically determined empirically in social value co-creation and managing natural resources literature. Although Jaakkola and Hakanen (2013) qualitatively explored how actors integrate resources in interaction to develop integrated solutions and identified the related benefits and sacrifices perceived by actors in different solution networks.

5.1.1.2 Consumer ownership is an essential value co-creation feature in the sustainable management of water resources.

Apart from the apparent benefits of water supply in the host community, it was revealed that the notion of ownership was essential to successfully co-create value. The analysis revealed the Sense of ownership among the community people. The water service systems (WASHCOM) members were willing to commit their resources to sustain the service system because of the perception of the water projects' owners. End-users perceived their contributory efforts as worthwhile because they viewed their services as their businesses, as illustrated in the interviews:

> ***"My expectation is for the community people to take the water project as their own and not government project because it is when they do that that it will work well with others" (Water point representative 12 in case region II).***

Rather than commissioning construction projects as mere facilities in the community, the analysed indicated that creating a system that impresses ownership into the end-users seems effective in generating social value (additional benefits) from the projects to the community beyond the purpose for which it was created. This strategy invariably imbibed acuity of ownership to the end-users. This perception of ownership in natural resource management enhances volunteerism, willingness and sincerity in delivering services. It is more likely to produce value in the environment of stakeholding jointly. Yik (2011) attributed perceived control to the value co-creation process. The author stated that a human driving force enabled people to motivate their competencies and superiority over their environment. This result is relatively similar to this paper's finding. However, perceived ownership as a feature of value co-creation, particularly in the project-based delivery system, is more critical than control. It has not been expressed in the literature to date.

5.1.1.3 End-user empowerment must be a feature of value co-creation for sustainable management of water resources.

Another critical feature that unfolded during the analysis was that the enabling environment of the service ecosystems enhanced the co-creating activities of the water project provider, including end-users. It was revealed in the analysis of both case regions (Bolorunduro and Araromi) the establishment of service systems involved developing apprenticeships in the value chain and providing work experience opportunities to sustain the delivery of the water project. The training-related issues impacted the commitment of the actors in the service system. The water service system promoted the actors' interests and willingness to use their resources - time, skill and money. From the analysis, the members of WASHCOM seemed to recognise the importance of their empowerment and that it impacted individual actors in acquiring additional specific skills outside the benefits of water provision. The apprenticeship scheme was interpreted as a form of social value creation in the community.

In addition, the findings unearthed that the provider's empowerment programme drove the willingness of an end-user to be involved in the service system. The willingness of an end-user to change other end-users to participate in joint activities is evidence that a well-empowered labour force is a more favourable labour force - which is a significant factor in the sustainable management of community-based projects. Several respondents pointed out "End-user empowerment" as a feature of social value co-creation shown in this quote.

> ***"WASHCOM is a government initiative support after the provision of the water supply project. We were trained and given tools to enable us to work effectively. Although, in case of major damage and repairs, I, as the coordinator, will write RUWASAN, who will now send the maintenance officer to carry out the major repairs" (Coordinator in case I).***

Yik (2011) defined empowerment as pro-activeness in the engagement and willingness to change other actors for active co-creation. End-user empowerment is a feature of social value co-creation when providers put support systems and resources for end-users to enhance the joint production of benefits in the service system.

5.1.1.4 Sense of social unity forms a critical role in value co-creation of water resource management

In co-creating social value for water projects, it is apparent that both end-user and providers have the shared value to provide appropriate resources in terms of expertise and judgement. When end-users display a sense of social unity, it produces relevant and practical benefits in natural resource projects is crucial. Apart from resource integration, other features of value co-creation, such as end-user empowerment, consumer ownership, and knowledge transfer, are all critically related to developing a sense of social security. As unearthed in this paper's findings, end-users empowered with pieces of training as competent resources to collaborate with other actors would be committed to serving effectively. The goal-oriented nature of togetherness in the design of a service system could assist in overcoming co-creating challenges. It would give rise to a sense of social flow among actors participating in the service system. The stronger the Sense of unity among actors, the likelihood for more beneficial activities towards sustainable management of community-based projects. A "sense of social unity" can be motivated in an environment of collective interest and goal, as revealed in the analysis below:

> ***"There were times I received bills with due dates for payments. I could go as far as taking a loan having seen the commitments of the members of WASHCOM, more importantly, did not want to suffer getting water from a far distance (water rep. in 8 – case I)".***

This work's finding of "a sense of social unity", particularly in Bolorunduro case region I, resonate with the description and outcome of "collective impact" as a principle of the community project's delivery in Raiden et al. (2019). The authors suggested that the end-users additional benefits from the community-based

service system could be associated with increased community integration, support for local businesses, improved wealth and community engagement. Furthermore, this paper's outcome expounded Raiden et al.'s findings of end-users bonding as a central feature of sustainable management of community-based projects. Therefore, while it may not be categorically stated that the lack of Sense of social unity threatened social value creation in Araromi case region II, it should be partially ruled out considering the logically expounded narratives provided.

5.1.1.5 Defined value-in-context provides a critical characteristic of sustainable management of water supply.

In the qualitative analysis, end-users clearly stated the value-in-context in terms of improved well-being and training experience, which gave rise to the interpretation of the type of value that was co-created, which was social value in this case. The qualitative analysis revealed value co-creation as definitive value-in-context defined by the end-users. The value-in-context experienced was identified by the end-users, which included improved well-being, reduction in water-related diseases, improved physical health and improved hygiene, among others. Several respondents revealed in the themes that emerged from the interview that "defined value-in-context" in the co-creation exercise is an "end user's definition of value".

> ***"I cherish water more than before, even though it now comes with a cost. Nevertheless, since it will be supplied, one is happy to make such payments because of its impact on my children's health and cleanliness in the entire house" (Water point representative 16 in case I)".***

The above remark demonstrated that actual benefits co-derived and defined by the end-users using particular projects are, in fact, a striking feature of social value co-creation, which contributes to the sustainability of such projects. Sanders and George (2009) highlighted that "Social value can provide use/experience value". That is like a flipside of this paper's finding – "Defined value-in-context is a feature of social value creation", which provides sensible logic. Moving the creation of projects from the provider to include the people it serves is more likely to produce the most significant benefits in terms of social value (Sanders and George, 2009). The value of co-creation is influenced by the provider's desire to convert the end-users into co-actors so that the products or services they design, produce and sell will better meet people's wants and needs. Therefore, defined value-in-context is a characteristic of value in co-creation. This work's finding is similar to the findings of Halinen and Jaakkola (2012). The scholars highlighted in their study that the value perceived by consumers determines the success of any business exchange. Summarily, defining the value-in-context of a particular service, interpreted as "social value" in this paper, is a significant feature that could ensure the sustainability of water resource projects.

5.1.1.6 Behavioural transformation of end-users influences sustainability of water resource projects

The analysis revealed the willingness of community people to change others for productive joint activity. This finding suggests a form of behavioural modification during value co-creation. End-users involved in the water service system had a change of attitude (favourable) towards activities in sustainable management of the community projects. Mainly when a provider is prepared to enable the end-user with opportunities, this could change the end-user negative attitudes to respond to this action positively. The involvement of end-users as "active partners" (co-creators) creates social value and builds trust over time. The below quote is from the technician in case II among several respondents and reveals the importance of a deeper level of commitment through a two-way co-creation process.

> ***"Yes, project management has changed my attitude towards community projects. Everybody knows that WASHCOM is trying for the water project. I also want even to do more and encourage my friends because I do not want the water project to be abandoned." (Technician - case II)".***

The analysis also revealed that the behaviour of the end-users could impact Bolorunduro's viable service system. As such, behaviours that do not augur well towards the common goal of the Bolorunduro water resource system will not produce the joint creation of social benefits. Alexander (2012) defined the need for a behavioural transformation condition that builds trust during co-creation, while Wang et al. (2021) reinforced the need for project/product to be controlled by attitude and perceived behaviour. Therefore, the emergence of aligned behaviour to support the sustainable management of water resource projects is a feature of social value co-creation.

5.1.1.7 Social value co-creation requires knowledge transfer for sustainable management of water resource project

The qualitative analysis revealed the transfer of accumulated experiences, competencies, and skills within the service system. Actors' ideas and competencies that stimulate value co-create are interpreted as tacit knowledge. The interpretation was based on beliefs shared by actors at an unconscious level. This work's analysis discovered that tacit knowledge gained from experiences and derived from learning when integrated should benefit the service system's users (sustainable management of water resource projects). Both analyses from case studies I and II uncovered that one of the fundamental attributes of value co-creating is transferring accumulated experiences, competencies and skills among actors in the service system. The paper's findings indicated the process of value co-creation as a joint problem-solving activity. Various challenges of sustainable water supply were solved based on the interactions of actors in transferring their wealth of ideas and experiences. It was found out that the thoughts shared by actors at the unconscious level making it tacit knowledge, are expedient in value co-creation, as remarked below:

> ***"I brought the idea of payment instalments to WASHCOM. However, it got to a time when some community people gave excuses about their water bills and did not make payments as due. This caused conflicts between them and***

> ***consumers who made their payments before the due dates. My recommendations proffered some solutions to this hitch and enhanced the smooth operations in WASHCOM" (Financial secretary in case I)".***

Undoubtedly, knowledge has been repeatedly identified in S-D logic and value co-creation literature as a valuable resource in the value co-creating process. However, much literary work on knowledge in value co-creation has been in theory. Raiden et al. (2019) investigated the empowering design practice at The Glass-House Community Led Design, which involved knowledge transfer based on end-user experience. They impacted the functionality of the community-based water service system. The authors pointed out a flow of informally transferred tacit knowledge among workers in micro-firms, which supported value creation (joint problem-solving and transfer of knowledge). Our empirical data shows a more complex transfer among multiple actors in the water service systems. The following sections discuss the features of social value co-destruction.

5.2.1 Features of social value destruction – "Red flags" that could hinder sustainable management of water resource projects

One of the main focuses of this work was investigating the features of multi-actors in a service system consisting of joint production of benefits for the sustainability of water resource projects. Nevertheless, elements of social value destruction emerged during the qualitative analysis. Three value co-destruction features were discovered during the analysis of both case regions.

5.2.1.1 Misunderstanding of services' roles and Lack of community's cooperation leading to social value destruction of water resource management

A service system should provide an enabling environment for sustainable management of water resource projects; however, a misconception of the roles of actors in the service systems is a predictor of value co-destruction. A service system needs joint activities across actors. Actors can only work together when guided by the goal of the service system. Therefore, an agreement between providers and end-users is crucial in establishing a functioning service system, as revealed in the quote below among several related interviews collected.

> ***"Yes, WASHCOM tried so hard to manage the water project well before it was abandoned. Maybe we would have had a water supply if they had listened to our agitations. I asked if it was possible to have a dialogue with the government to take care of the water facility instead of involving us in contributing to the maintenance, but WASHCOM people would not listen. They were just carried away with the assigned roles and the training they had" (Water point representative 14)".***

Echeverri and Skålén (2011) stated that misinterpreting actors' roles in the service system and interactant disagreement are potential co-destructive elements. Like Echeverri and Skålén's study, misunderstanding the end-user and provider's roles contributed to the value destruction of this work's case regions. The unwillingness of actors to collaborate in terms of non-availability for meetings, non-contributions of finance and skill, and low perceived value, as evident in this paper's finding, discouraged co-creating activities,

particularly in Araromi case study II. When actors had experienced that their value co-creation attempts did not lead to sufficient perceived sustainable management of the water projects, it negatively impacted the collaboration with other actors and led to the dis-investment of resources. Lintula et al. (2018) 's study outcome highlighted "personal and collective conflict of actors in the service system" as a critical value co-destruction practice in managing water resource projects. However, this paper's result reinforces and advocates a more significant departure from that general thinking by suggesting that misunderstanding of services' roles and lack of community cooperation in the service system are symptoms of end-users and providers' conflict. Furthermore, misunderstanding the role of the service systems could be perceived as the inability of the service system provider to provide clearly stated institutions.

5.2.1.2 Value contradiction among actors in water resource management indicates value co-destruction.

This paper's finding suggests that when end-users experience value contradiction while participating in the management of water resource projects could lead to value e co-destruction. Similarly, this finding of value contradiction supports the arguments of Vargo et al. (2017) that in promoting co-creation, service providers ought to consider users' potential value dimensions, including both positive and negative sides of emerging value. Finally, this paper's finding implies that in collaborating with other end-users in sustainable management of water resource projects, a contradiction between an end user's identity-related values and collective value in the service system may become imminent for value co-destruction. Below is a remark from a community respondent that demonstrates this:

> ***"My expectation of the community people was to cooperate with WASHCOM. However, about 80% of the community people want continuous provision of water supply unhindered without making any commitments in terms of payments and attending meetings." (Water point representative 13 in case II)".***

Additionally, this paper extends the findings of Lintula et al. (2018). They stated that structuring collective identities is a focal system value proposition in promoting value co-creation for end-users of construction projects. Based on this paper's finding, when respondents compared the value obtained from personal-related contributions and collective value derived from the water resource projects could spur co-destruction practices. For instance, in this paper's outcome, some respondents withdrew their contributions to managing the water resource project. Furthermore, the analysis revealed that respondents had previously stated inequality in their personal resource contributions and, at times, non-participation of some actors in the water service system. Meanwhile, the value derived from the service system benefitted all the end-users.

Consequently, the respondents experienced a contradiction between their identified contributions as an actor and other actors' participation in the same service system—for example, resource contributions versus collective benefits. In designing a service system for community-based projects, understanding the end-users resource input versus the expected value derived must be considered to avert potential value

contradictions. Tuunanen et al. (2010) highlighted that the incommensurate actors' resources drove value co-destruction. However, this work's findings elaborate a deeper understanding of value co-destruction and red flags to look out for to avoid value co-destruction. To achieve sustainable management of water resource projects, it is critical that all actors fully understand the implications.

5.2.1.3 Unmet expectations/Absence or loss of resources experiences encourage social value co-destruction.

The analysis revealed that social value destruction arose due to critical service provision and value realisation issues, leading to unmet expectations. End-user's presumptions can remain unfulfilled, irrespective of their attempts to co-create. A communicative imbalance in the provider value proposition and the end-user sought value can negatively affect project delivery. For Araromi case region II, there needed to be more information or misconstrued perceptions among the end-users, resulting in value co-destruction. Inadequate information distribution from the provider in a service system is a symptom of adverse outcomes of value co-creation. The lack of information on the monetary aspect of the service system is interpreted to have generated potential value co-destruction. The quote, among many relevant quotes, illustrates one such example.

> ***"The government should have considered and planned for providing some money to WASHCOM, say monthly, to take care of repairs even during the construction stage, instead of making the maintenance of the water project our own (Water point representative 14 in case I)".***

Fuentes (2019) signifies that value destruction could emerge when end-users are treated as consumers in project delivery rather than project partners. This paper's finding supports Fuentes (2019), highlighting that end-user lack or perceived loss of resources led to value co-destruction. Similarly, Baumann et al. (2017) show that improving communication and fostering transparency (Im and Qu, 2017) between end-users and providers of projects will prevent distorted end-user expectations and low perceived value. Thus, forestall value destruction outcomes.

Based on data analysis, interpretations and reasoning, a framework is developed in Figure 2 to illustrate the enabling platforms and management practices that can enhance social value creation in community-based infrastructure projects. Additionally, Figure 2 indicates the features of social value that would emerge from identified management practices, including "red flags" to look out for when adopting the management practices.

Figure 2: Towards a framework of social value co-creation/destruction "(SNVCC/SNVCD) as a business model for sustainable infrastructure projects

6.1 Conclusion

We investigated how social value is co-created among multi-actors in water supply projects (systems). Adopting social value and value co-creation concepts in service ecosystems should drive the sustainability of infrastructure projects. However, projects are not delivered in a vacuum environment; therefore, the involvement of both internal and external stakeholders should be highly considered in the project delivery process.

This work unearthed seven features of social value co-creation and three features of social value co-destruction in the water service systems. The social value co-creation features include Resource integration, Consumer ownership perception, End-user empowerment, a Sense of social unity, Defined value-in-context, Behavioural transformation, and Knowledge transfer. Additionally, the features of value destruction include Misunderstanding of service's roles/Absence or loss of resources, Value contradiction, including Unmet end-user expectations/Lack of community cooperation. It was revealed that the emergence of these features in service systems is significant because their combinations provide evidence to processes, activities, and outcomes involved in water resource projects' active and goal-oriented service ecosystem.

Value co-creation in service systems must be studied to manage water supply projects effectively. Social value co-creation is essential in understanding such projects' sustainability. However, multi-actor activities in service ecosystems do not guarantee value co-creation and sustainability of water resource projects. It is subject to the design and institutions of the service systems managing the projects. This work is the first attempt to reveal features of social value co-creation for sustainable management of water supply and the associated "red flags" (social value destruction).

6.1 Recommendations and further explorations

To improve the business model for sustainable infrastructure projects, selecting stakeholders with appropriate knowledge, skills, and experience to achieve collaborative social value is highly crucial. Additionally, to reduce the "red flags" (social value destruction) during the creation of social value in an infrastructure project, roles and responsibilities must be clearly defined at the outset of the formation of stakeholder engagement in construction project delivery.

The use of the digital platform to illustrate an interactive relationship among stakeholders is encouraged for further research. The evaluation of information technology and the development of an app to collect data among stakeholders for social value creation is worth investigating. The

use of this work's theoretical framework – value co-creation and service ecosystems in Corporate Social Responsibility (CRS) projects represents an exciting research area.

The three enablers of sustainable infrastructure projects are social value, service ecosystems and value co-creation.

Acknowledgment
We acknowledge the financial sponsorship of this research by the Schlumberger Foundation faculty for the future. We say a big thank you to them.

CRediT authorship contribution statement

Omoleye Ojuri: Conceptualisation, Methodology, Formal analysis, Investigation, Original draft preparation, Writing - review & editing.

Grant Mills: Supervision, Writing - review & editing.

Alex Opoku: Supervision, Writing - review & editing.

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Table I: Themes categorisation

S/N	Themes	Description
1	**ATTRIBUTES OF VALUE CO-CREATION**	
1.1	End-user empowerment	*WASHCOM is a government initiative support after the provision of the water supply project. We were trained and given and tools to enable us work effectively. Although, in case of major damage and repairs, I, as the coordinator will write RUWASAN who will now send the maintenance officer to carry out the major repairs.*
1.2	Resource integration	*Money is important, repair skill, maintenance and organisation skills are all necessary for the functionality of the water project. That was why the members of WASHCOM were selected based on individual capabilities. Nevertheless, the interactions toward the goal of the system were highly essential. I paid my bills, which was my contribution towards water supply, since I was not a technical person. When all these resources were combined for a common goal, it ensured that we get water supply uninterrupted.* *Although WASHCOM and RUWASAN put together are indeed important for proper administration. The water supply facility would not have served the community if there were no community meetings which ensures the assembly of all stakeholders of the water projects, to combine our incomes including skills together to ensure functioning water supply system.*
1.3	Behavioural transformation	*WASHCOM has changed my attitude towards water, in the sense that I frown at anyone not handling the facilities well because we will pay for the repairs if any damage occurs. Yes, it has changed me a lot. In the overall, there has been an improvement in our wellbeing in the community ever since we have been having access to water supply.*
1.4	Defined value-in-use	*I cherish water more than before even though it now comes with a cost. But since it will be supplied, therefore, one is happy to make such payments because of its impact on my children's health and cleanliness in the entire house.*
1.5	Consumer ownership	*My expectation is for the community people to take the water project as their own and not government project because it is when they do that that it will work well with others.*
1.6	Knowledge sharing	*I brought the idea of payments in instalments to WASHCOM. It got to a time when some consumers were giving excuses about their water bills and not making payments as at when sue. This actually caused some conflicts between them and consumers that made their payments before due dates. My recommendations provided some solutions to this hitch and enhanced the smooth operations in WASHCOM. I have also brough the idea of getting people to do business with selling of spare parts in the community.*
1.7	Sense of unity in the community	*Despite the financial challenges the consumers face at times, the efforts of the members of WASHCOM and their devotion to ensure uninterrupted water supply service to the consumers were extremely satisfactory.*
2	**ATTRIBUTES OF CO-DESTRUCTION**	
2.1	Lack of cooperation from the community	*Yes, I expected the community people to think about the project as theirs, after all, they get water from it, but they just saw it as a property from the government.*

2.2	Unmet expectations	*The government should put more money for maintenance because it is really difficult for us to do that.*
2.3	Value contradiction	*My expectation of the community people was to cooperate with WASHCOM. The community people say, 80%, want continuous provision of water supply unhindered without making any commitments in terms of payments and attending meetings.*
2.4	Lack of understanding WASHCOM's roles	*Yes, WASHCOM tried so hard to manage the water project well before it was abandoned. May be, we would have still been having water supply now if were we listened to. I asked if it was possible to dialogue with the government to take care of the water facility instead of involving us in all the maintenance, but WASHCOM people would not listen. They were just carried away with the assigned roles and the training they had.*
2.5	Lack of resources from community	The government should have considered and planned for providing some money to WASHCOM, say monthly to take care of repairs even during the construction stage.

Table II: Summary of features of social value co-creation in case regions I and II from the analysis

Features of social value co-creation in case study I	**Features of social value co-creation in case study II**	**Compiled features of social value co-creation in case studies I and II**
Resource integration	Resource integration	Resource integration
Consumer's ownership perception		Consumer's ownership perception
End-user empowerment	End-user empowerment	End-user empowerment
Sense of social unity		Sense of social unity
Defined value-in-context		Defined value-in-context
Behavioural transformation		Behavioural transformation
Knowledge transfer	Knowledge transfer	Knowledge transfer

Table III: Summary of features of social value co-destruction in case regions I and II from the analysis

Features of social value co-destruction in case region I	**Features of social value co-destruction in case region II**	**Compiled features of social value co-destruction in case regions I and II**
Misunderstanding of service's roles/lack of community's cooperation	Misunderstanding of service's roles/lack of community's cooperation	Misunderstanding of service's roles/lack of community's cooperation
	Value contradiction	Value contradiction
Unmet expectations/Absence or loss of resources	Unmet expectation/Absence or loss of resources	Unmet expectations/Absence or loss of resources

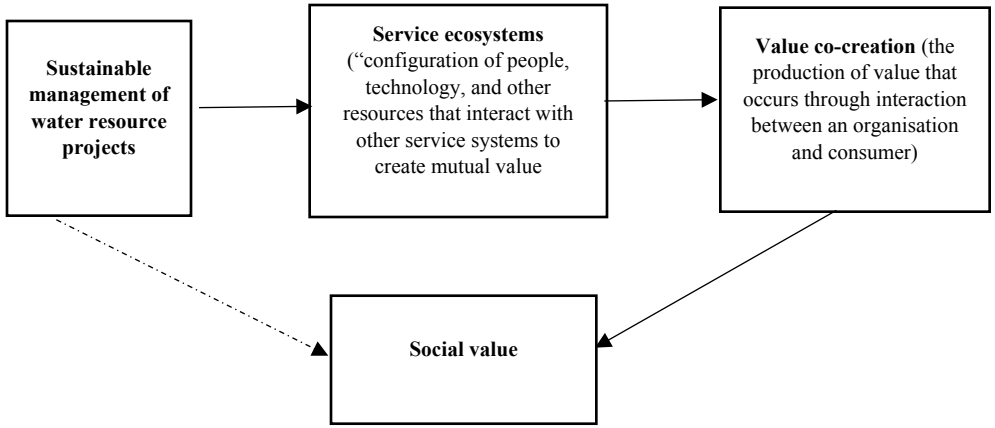

Figure 1: Conceptual Framework

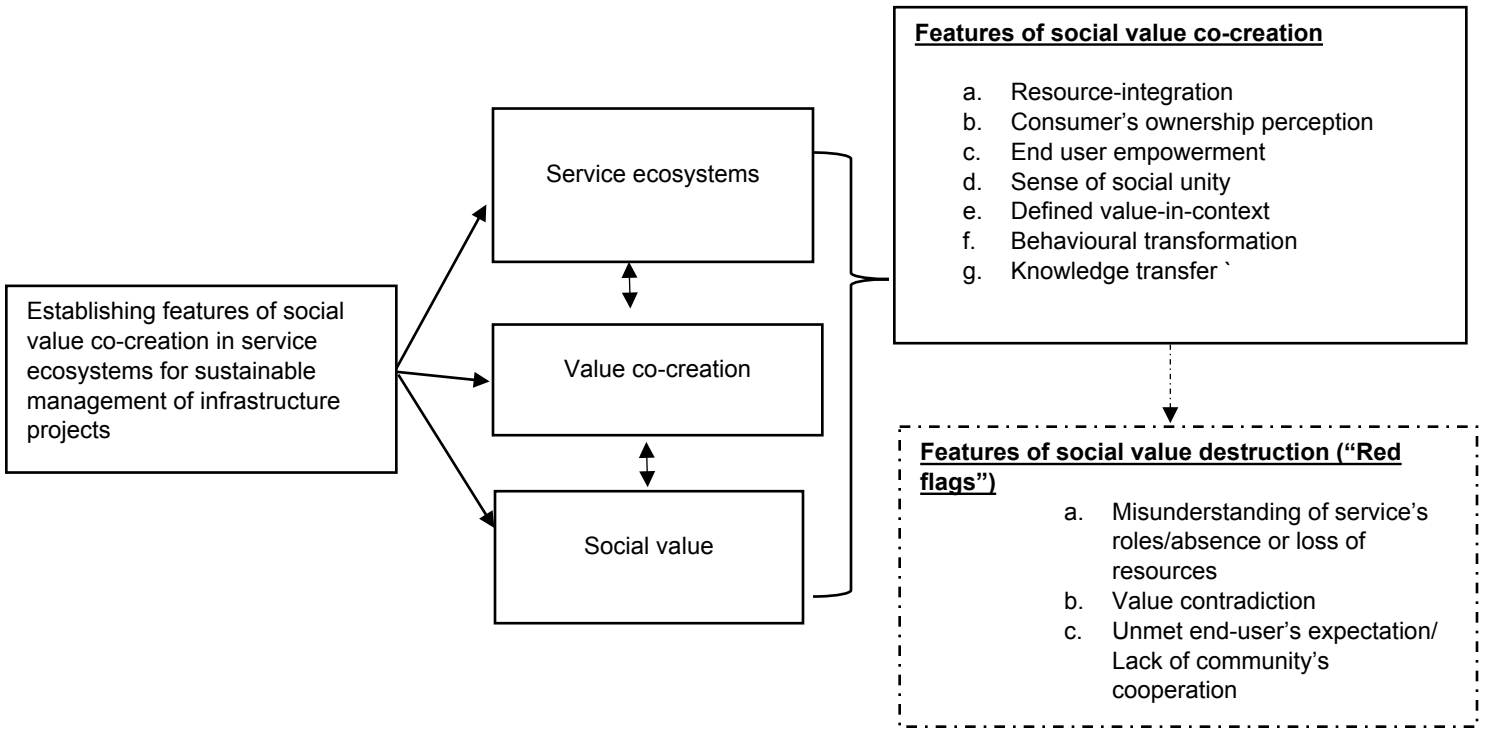

Figure 2: Towards a framework of social value co-creation/destruction "(SNVCC/SNVCD) as a business model for sustainable infrastructure projects