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Session 4: Communication 10:

*Pathway to accessible and sustainable clean water to communities in
developing economies through a collaborative support model: A case
study in Sustainable Development Goal (SDG) 6*

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Session 4: Water, Agriculture and the SDGs

Chaired by Dr. Abhishek Tiwary, IESD

Pathway to accessible and sustainable clean water to communities in developing economies through a collaborative support model: A case study in Sustainable Development Goals (SDGs) in Sri-Lanka

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Abstract

In Sri-Lanka, due to climate change, most of the rural villages have difficulty accessing clean water. With the United Nations (UN) initiatives set in 2015 to Transform the world by 2030, 17 Sustainable Development Goals (SDGs) are set to tackle multiple challenges humankind is facing to ensure economic prosperity and environmental protection. However, due to the disparities between developed and developing economies, some developing countries such as Sri-Lanka will require a more substantial design and implementation to achieve the SDGs effectively. In this paper, a collaborative support model has been developed to provide clean water to Hippola village, Sri-Lanka. The Participatory Action Research approach is adopted in formulating, implementing and evaluating the model. Results suggest clean water (SDG6) has a synergistic impact on improving health (SDG3) and reducing poverty (SDG1) in Hippola village. However, these findings are limited to a village that depends on agriculture produce as their main source of income.

Keywords: Collaborative support model, Participatory action research, SDGs, Sri-Lanka

Introduction

According to the UN SGD report (2019), it is observed that developing countries are struggling more than developed countries in achieving SDG goals. A common struggle among many developing countries is providing access to clean water to their people. In the 2019 Human Development Report, Sri-Lanka is highlighted as one of the countries in need of clean water supply. More specifically, many rural villages in Sri-Lanka, including central province, cannot access to clean water. Although in 2010, the local government took the initiative to provide clean water nation-wide, due to the financial constraints it was unattainable for the government (Wijesinghe *et al.*, 2019).

The lack of access clean water directly relates to health issues and hinder the income opportunities of rural villages in Sri Lanka. (Wijesinghe *et al.*, 2019).

Purpose of this study

The purpose of this study is to develop a collaborative support model that assists in facilitating safe, clean and affordable drinking water for the rural villagers in Sri Lanka (SDG, 2019). This study adopts the Participatory Action Research (PAR) approach and aimed to synthesis the available resources into a systematic framework and develops a collaborative support model to facilitate the rural villages to access clean water. The model will be based on the Social Capital Theory (Aguilar and Sen, 2009) and adopts a collaborative support model, where different stakeholders will collectively contribute different resources to facilitate access to clean water to the people in Hippola village. Also, this model can assist and support the attainment of SDG 1 and SDG 3 (OCED, 2019). The collaborative support model will be developed and implemented through four cyclical processes of action research (Johnson 2008). The paper intends on fulfilling two objectives:

1. To explore the development and implementation process of the clean water project.
2. To design a collaborative support model to facilitate access to clean water to the rural villages.

Sarvodaya Organisation

To achieve the two objectives of this study, cooperation with Sarvodaya organisation was necessary. Sarvodaya organisation is a non-government modern community development organisation established in 1958. The vision of the organisation is to build a self-reliant and peaceful project in the Sri-Lankan communities. Sarvodaya organisational structure comprises of four-levels with the head-office at the top, with district centres and divisional centres, and village societies at the village level. To conduct a village project, villagers need to establish a Sarvodaya society in the village, which can act as a mediator between the organisation and the stakeholders.

From 2018/19, multiple stakeholders along with Sarvodaya Organisation collaborated in a two-year PAR programme, intending to provide access to clean water in Hippola village.

Methodology

This study applied a qualitative approach as it offers rich and detailed information order to gain more insights into the experiences of the villages in developing the model. Accordingly, the study employs a systematic thinking approach to decouple the complexity in addressing the basic needs in the Hippola rural village in Sri Lanka (Selener, 1993; Conchelo, 1985). By meeting the UN Decades approach to clean water supply and sanitation; this project achieved a higher level

of community participation concerning four criteria relating to national projects to be acceptable for external findings.

Participatory Action Research Approach

Mertler (2018) defined Participatory Action Learning design implement in cyclic nature. The participants actively engage in planning, designing and implementing a project. Participatory Action Learning approach allows practitioners and social researchers to articulate how scholarly contexts, action-learning tasks, project implementation, and evaluation tasks and strategic management resources designed to promote effective collaboration between organisations, resource persons and beneficiaries. The participatory framework is adopted to facilitate as a supportive and collaborative tool to formulate, implement and evaluate social development projects.

A single case study approach - Hippola Village

The outcomes informed the development of the PAR model conducted in the Hippola village, situated in a remote location in the Kandy district in Sri Lanka with a population of 980, with a total of 212 families.

The study adopts a case study strategy as it offers a flexible opportunity to obtain a holistic understanding of the context and gain more insights into the experiences of the villagers. Most of the villagers work as labourers or farmers with few government workers, and the majority of them struggle to fulfil their basic needs due to low development conditions.

Although there is a small stream of water supply from the mountainside passing through the village, due to climate change, the stream is mostly dry throughout the year. Thereby, the only access to water is through the rain. However, villagers have observed that the rainwater and the water from the small stream are contaminated with chemicals. Besides, there is inadequate government support in this village due to financial funding. Thus, Hippola village is identified as the potential village to develop and implement the clean water project.

Sample size: The sample size of 26 people which includes 20 villagers, four representatives from the Sarvodaya organisation and two representatives from other supportive organisations. The participants from the village were recruited from the Sarvodaya society in the village, and their participation was entirely voluntary.

Data Collection Process

The data collection for this study was conducted in three stages:

Stage One: In the idea generation stage, a focus group was conducted to identify the needs of the villagers. Five villagers who are members of the Sarvodaya society, including the Chief Temple Monk of the village and two representatives from the Sarvodaya organisation, participated in a focus group.

Stage Two: Another focus group was conducted with different stakeholders to ensure the implementation of the clean water project.

Stage Three: After the completion of the project, fifteen semi-structured interviews were conducted with ten villagers and five representatives who were involved in the project. In this stage, further insights into the participants' experiences were gathered, to assist the development of the collaborative support model.

Data Analyses: The collected qualitative data were analysed manually following thematic analysis (Yin, 2018; Creswell and Creswell, 2018).

Results

In this section, a conceptual model links project analytics to the construction of a water-well in a village is presented. The conceptual framework consists of six dimensions: temporal analytics, comparative analytics, stakeholder dynamics, community collaboration, project-specific analytics, and contingency and intervention support tools. In the proposed conceptual model, Sarvodaya village society plays a central role with the support of Sarvodaya organisation in bringing context to the analysis and making the decision on the information received from the stakeholders as well as the scaffolding and adaptation of a project design. Before designing the model, the active stakeholders of the project are presented. After that, their contribution to the four cycles of the PAR is outlined. Along with their contribution to the different stages of implementing the project.

Stakeholders

In completion of this project, different stakeholders were involved, which are presented in Figure.1. Throughout the project, eight stakeholders were identified as active contributors to the project.

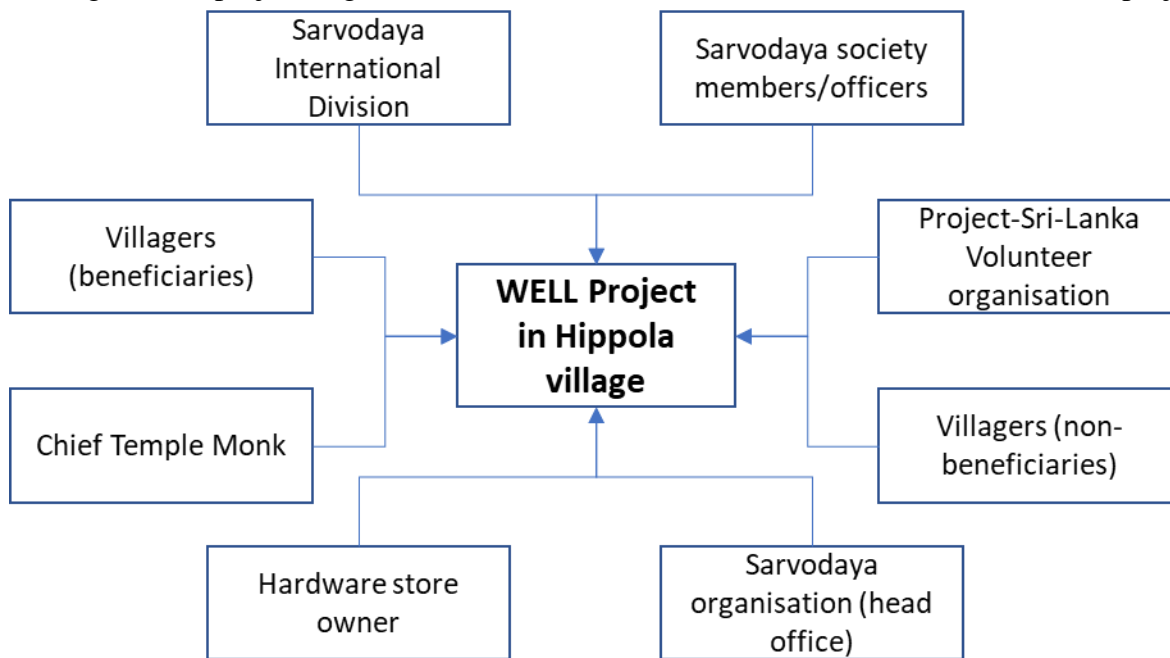
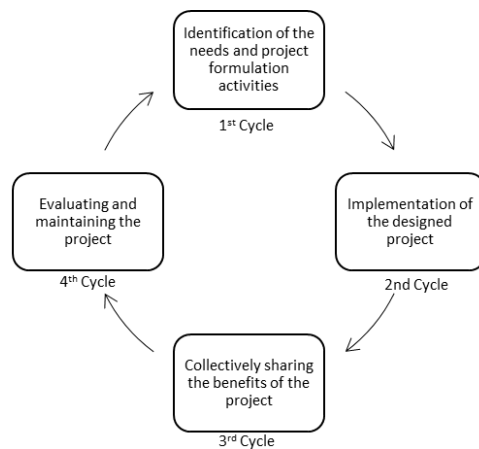


Figure 1:Stakeholders of the project

The first key stakeholder is the Sarvodaya International division, which was responsible for coordinating the project, and for finding small financial donors to support this project. The second stakeholders are the members and officers in the Sarvodaya society located in the village, which provides memberships to the villagers to become part of the Sarvodaya society and there are officers appointed by the organisation to run the branch. As such, the society members promised to provide raw materials such as sand and bricks to the project. The officers were in charge of maintaining the finances of the project. The third stakeholder is the Project-Sri-Lanka Volunteer organisation (NGO), which is a UK based organisation that Sarvodaya international division got in contact through their connections. The NGO decided to get indirectly involved by donating a small grant to the project. The fourth stakeholders are the villagers is classified into two groups: beneficiaries and non-beneficiaries of the project. Although all villagers contributed to the construction of the water-well, ownership of the water-well belongs to the landowners. Therefore, landowners are classified as beneficiaries, and the rest of the villagers are classified as non-beneficiaries in the project. The beneficiary villagers agreed to provide skilled and unskilled labour to the project, and also to provide food and drinks to all workers in the project. Similarly, non-beneficiaries also agreed to provide food and drinks and created easy access to carry the raw materials to the project site. The fifth stakeholders are the Sarvodaya organisation (head office), who agreed to provide the remaining raw materials such as cement, iron bars and concrete gravel to the project. The sixth stakeholder is the hardware store owner, who decided to provide free transport of the raw materials from the store to the project site. Finally, the seventh stakeholder is the Chief temple monk, who arranged daily visits to the project site to provide moral support to the workers. Community participation was a necessary element to successfully implement the project, which can be observed by exploring the stakeholders' contributions in the PAR cycles, presented in Figure.2.



Cycles of the participatory action research	Stakeholders of the project								
	Sarvodaya International Division	Sarvodaya Society members	Sarvodaya Society officers	Project-Sri-Lanka organisation	Non-beneficiary villagers	Beneficiary villagers	Sarvodaya Organisation (Head Office)	Hardware store owner	Temple Monk
Identification of the needs and project developments activities	✓	✓	✓	✓	✓	✓	✓		✓
Implementation of the designed project	✓	✓	✓		✓	✓	✓	✓	✓
Collectively sharing the benefits of the project		✓			✓	✓			✓
Evaluating and maintaining the project	✓	✓	✓		✓	✓	✓		✓

Figure 2: Stakeholders contribution to the PAR cycles

In the PAR cycle presented in Figure.2., the first cycle was conducted through the stage 1 data collection, where it was identified through a ranking that the villagers highlighted access to clean water (SDG6) at the highest priority. Due to contaminated rain and sessional stream water, villagers are currently suffering from minor health issues and kidney failures. During the focus groups, almost all participants confirmed the urgency of identification of the solutions and provided the necessary information. Thereby, along with the feedback from the participants, Sarvodaya organisation developed a project. Also, the organisation received a small grant from the Project-Sri-Lanka (UK NGO) for the implementation of the project. In the second cycle, conducted a focus group, to gather resources from stakeholders to implement the project. In the third and fourth stages, the beneficiary and the non-beneficiary villagers reap the benefits of the project.

Thereafter, led an evaluation of the project, where identified this clean water project as a conceptual guideline which set a practical example on how to establish a support model to be more people-friendly and people-centric. In the last focus group, participants' reflection on the project was expressed. It was highlighted that developing a water scheme, the guidelines and set criteria need to be commenced with local-level engagement. The understanding of this statement can be observed in practice, projects directed by political parties or channels or influential leaders, which have been less successful due to internal conflicts or by lack of community-level participation and absence of motivation for voluntary labour or participation (Boot and Heijnen 1988).

Based on the evaluation it was inevitable that stakeholder's contribution and collaboration to the project led to its success, therefore in the next section, the break-down of each stakeholder's contribution towards the different stages of the project are presented in Table 1.

Stakeholders	Pre-project contribution	Intra-project contribution	Post-project contribution
Sarvodaya international division	✓	✓	✓
Sarvodaya society members		✓	
Sarvodaya society officers		✓	
Project-Sri-Lanka organisation	✓		
Non-beneficiary villagers	✓	✓	✓
Beneficiary villagers	✓	✓	✓
Sarvodaya organisation (Head office)	✓		
Hardware store owner		✓	
Chief temple monk	✓	✓	✓

Table 1: Stakeholders contribution to the different stages of the project

The contribution of the stakeholders can be classified into three stages pre/Intra/post-project. The pre-project contribution accounts to all the contribution activities conducted before the start of the project, such as planning gather funds and raw materials. The intra-project contribution considers all contributing activities that took place during the project, such as coordinating the project, manual labour, provision of food and drinks, and moral support. Finally, the post-project contributions consist of contribution activities after the project completion, such as maintenance of the water-well and collecting feedback from the villagers for further necessary improvements.

Based on these understandings, established a conceptual model that links these project analytics to the construction of the water-well.

Temporal analytics

The temporal dimension in the conceptual model considers the events that occurred throughout the project. Interviews after the project indicated that they valued the contribution of the stakeholders, and the success of the project was not possible without their support. Therefore, it is essential to observe the contribution of the events that occurred in the project. Temporal "events" specified in the project fell into the following three categories:

Recurring Events

Contribution events that occurred at the same time each day such as Temple Monk's blessing, provision of food and drink, and manual labour to construct the water-well.

Submission events

Contribution events which included the due date for the start of the project, such as allocation of the villagers, provision of the raw materials, and gathering the funding. These contribution events are necessary to start the project.

Single Events

Contribution events that only occurred once during the project, such as the contribution of the hardware store owner (transportation), donation of a small grant from the Project-Sri-Lanka volunteer organisation.

Comparative Analytics

Comparative analytics allow Sarvodaya to observe patterns or relations between two or more aspects of the project. Sarvodaya organisation conducts this analysis, where they review the progression of the project and report to Sarvodaya village society. Also, these analytics compares the activities and levels of contribution of the stakeholders with each other over time. This type of analytics is only possible with a clear knowledge of the project structure and activity schedule within the project. Therefore, before the start of the project, detailed planning was necessary between the key stakeholders, which in this project are all stakeholder who contributed to the pre-project stage.

Comparative analytics in this context is defined as the provision of analytics in a form that enables Sarvodaya to compare different types of contributions that may occur within the same time as well as the same types of activities occurring over different timer periods. Examples include:

- The ability to compare villager's productivity, Sarvodaya society officer's involvement and Chief temple monk's visits over the whole project.
- The ability to compare stakeholders' contributions by weekly or daily

Comparative analytics is not restricted to the temporal domain and is equally applicate to forecast analyses for this project or any other future projects of Sarvodaya. In this way, comparative analytics provides a lens through which the structure and sequences of designed contributions within the project, implemented through the use of detailed planning, can be evaluated.

Stakeholder dynamics

Participants in the interview highlighted that community support was essential for the success of this project. Therefore, understanding of the community dynamics can help determine how different groups of stakeholders interact and engage with an overarching and specific project. In the context of this project, it was identified that although the hardware store owner had no personal connection to the village, the owner provided some contribution to the project. It was understood that the owner was sympathetic towards the villagers and supported the project, thus provided his contribution to the project. Also, through the interviews, it was stated that although some villagers had disputes with each other, their kindred spirit towards the project led them to collaborate. The implication is that the model may be more successful by particular groups of stakeholders, resulting in different levels of success. Highlighting the projects may need to scaffold, or interventions may need to be considered for particular stakeholders. Stakeholder dynamics may also differ between different types of projects such as long-term projects, that must be understood in real-time in order for the project to be successful.

Community collaboration

Almost all participants in the interview highlighted the importance of their community collaboration on this project, as they believed without their community support, this project will not be successful. This

form of understanding is quite typical in community-based projects, especially in small communities, as people tend to share a closer bond than larger communities, resulting they need to stay together to succeed. This form of understanding was observed throughout the project, even before the start of the project, as villagers in Hippola were sharing a common problem, and united they wanted to solve it. Thus, community collaboration dimension can be drawn to the principles of social collaboration theory, where multiple stakeholders interact and share information to achieve a common goal. In this case, the common goal was the construction of the water-well in the village.

Project-specific analytics

While temporal analytics relate to all contribution events conducted in the project, it has been observed that the need for analytics was explicitly tailored to the particular project conducted to this project. Simple analytics included the analysis of the prices of the raw materials of the project, and more advanced analytics included the understanding of the geographical landscape of the village and the location where the water-well is going to be constructed. Project-specific analytics can be applied in conjunction with comparative analytics, stakeholder dynamics and community collaboration. In particular, there is potential to compare the emergence of additional stakeholders based upon similarity to be discovered.

Contingency and Intervention Support Tools

Interviews from the participants highlighted the importance of identifying and intervening when a stakeholder was determined to be potentially "at-risk". In most cases, the necessary intervention was with the beneficiary and non-beneficiary villagers. Participants indicated that the stress of working under adverse weather with the determination of completing the project led some villagers to exhaust themselves, resulting in the need for medical assistance. The contingency dimension is associated with the stakeholder dynamics and community collaboration dimensions, as patterns established based on stakeholder similarity discovery algorithms will allow Sarvodaya international division to effectively select and identify stakeholder groups for some kind of intervention. The contingency is only an outcome of stakeholder dynamics and community collaboration- after the Sarvodaya organisation has understood why stakeholders in a particular group were similar and relied on that information to the society, with regards to their approach to their contribution towards the project.

Project Collaboration conceptual model

Figure.3 illustrates the proposed collaborative support model for clean water supply to rural villages. The proposed model aims to transform project design into a community-led enquiry-based practice. In the model, the Sarvodaya society in a village plays a central role with the support of the Sarvodaya organisation in bringing contextual knowledge to the review and analysis of the project analytics and then in making decisions about contingency.

The model incorporates the different analytics dimensions that emerged from thematic analysis of the semi-structured interviews, focus groups, and implementation of the project, namely temporal analytics, stakeholder dynamics, community collaboration and project-specific analytics. Comparative analytics and related support visualisations are relevant across all other analytical dimensions and contribute to the Sarvodaya organisation's ability to make sense of the data, and support in the planning and formulation of the project. Comparative analytics, therefore, provides the lens through which the organisation evaluates the project design implementations within the village in direct relation to the activities of the stakeholders.

The Sarvodaya society in the village, which is part of the organisation but independent, as the villager's control and run the society, plays the central role within the collaborative support model in bringing the stakeholders together and implementing the project. Although Sarvodaya organisation initially identified and planned the project, Sarvodaya village society is responsible for in-project decision making and coordination of the project.

In the model, contingency occurs as the output and is the result of project decisions by the Sarvodaya society in the village, and the comparative analytics conducted by the Sarvodaya organisation. Contingency can take the form of restored or scaffolded project activities recommendations and feedback provided to distinct stakeholder groups. Contingency requires the organisation to understand the different types of analytics and interpret the patterns emerging from the stakeholder dynamics and community collaboration. Contingency also relies on the availability of tools to identify, select, filter and communicate feedback to Sarvodaya society in the village.

The stakeholder dynamics and community collaboration need to be supported by algorithms that can discover and provide interpretable stakeholder usage and similarity pattern to the Sarvodaya organisation, with then can be relayed to the Sarvodaya society in the village. These algorithms can usually take the form of collaborative filtering, which in this context predicts the stakeholder's relationship with other stakeholders based on the recommendations gathered from previous projects (Herlocker et al. 2002).

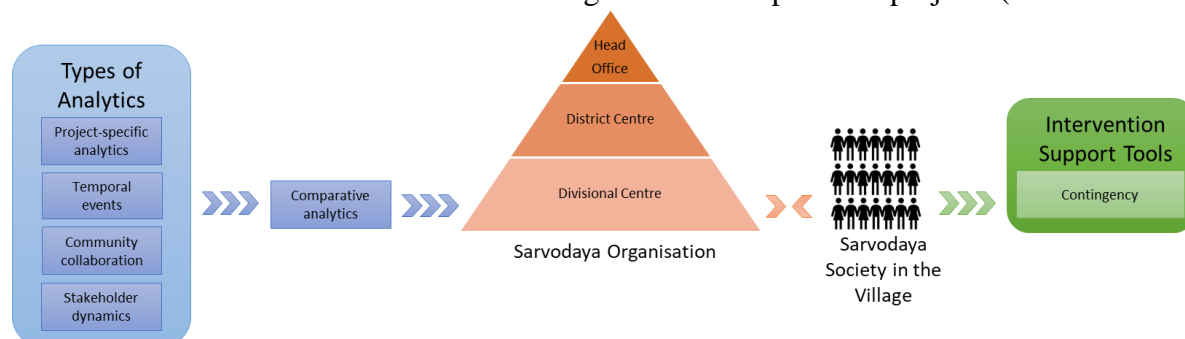


Figure 3: Collaborative support model

Limitations and Implications

It is important to note that this study was conducted in Hippola village in Sri-Lanka, and more specifically, in a rural village with only 980 villagers. Thus, our findings cannot be generalised to the whole population either of Sri-Lanka or the world. This study did not conduct any statistical analysis of the relationship between the stakeholders. Thus, our proposed collaboration model is based on qualitative data from the PAR in Hippola village, Sri-Lanka.

As described above, this study found evidence that the availability of clean water played an essential role in the functioning and supported the livelihood of the villagers. As villagers in Hippola village depend on water, for their agricultural produce, which is the main source of income for many villagers in Hippola. Over time, it has been notified that villagers have used the water-well to expand their cultivation to different vegetables further, their creating new sources of income and overall reducing the poverty levels in the village (SDG1). Also, based on data collected in stage four, it has been highlighted that the villagers have felt more productive and healthier, mentally and physically. This aspect was outlined concerning the increased activity levels of farming, and the villagers knowing that they are drinking clean and uncontaminated water from the water-well (SDG3).

This evidence can be used by public health policymakers and health practice makers of rural villages around the world, to implement this collaborative model to provide clean water to the villagers. Using a collaborative model is considered to be an efficient approach to successfully implement a clean water project in a small rural village in a developing country. As found in this study, a village without access to clean water can lead to decremental impacts to their poverty situations and, their mental and physical health, especially in a small rural village in a developing country which depends to agriculture as their main source of income.

Conclusion

In this paper, we have proposed a collaborative support model for clean water supply. An understanding informed the model of the types of project analytics that would be useful to support the evaluation of clean water project designs. While clear dimensions of the types of analytics required emerged from participants, it was evident that Sarvodaya society in the village played crucial roles in bringing the stakeholders together and decision-makings of the project. However, Sarvodaya organisation played a supporting role in the interpretation of the analytics of the project and communicating it to the society. The proposed framework makes a useful contribution, as the adoption of a collaborative support model within the PAR initiatives implies that more flexibility on funding and resources structures are possible. In practice, organisations can collaborate with the villagers to successfully implement a project in the village. Although this model outlines collaborative support with people at the village level, further research is necessary to assess whether this model can promote collaborative support at a nation-wide level.

Acknowledgements

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Pathway to accessible and sustainable clean water to communities in developing economies through a collaborative support model: A case study in Sustainable Development Goal (SDG) 6,

By Dr. Ramani Priyadarshani Gallellalage, (on behalf of Ramani Priyadarshani Gallellalage, Ovinda Wijeyaratne, and Bandula Senadeera of Nottingham Trent University)





Conference on Aligning local interventions with the UN SDGs

Pathway to accessible and sustainable clean water to communities in developing economies through a collaborative support model: A case study in Sustainable Development Goals (SDGs) in Sri-Lanka

Ramani Priyadarshani Gallellalage (Presenter)

Ovinda Wijeyaratne

Bandula Senadeera





Conference on Aligning local interventions with the UN SDGs

Background

- UN has set 17 Sustainable Development Goals initiatives in 2015, which can support to transform the world by 2030 (SDG 2015).
- Due to disparities between developing and developed economics, some developing countries will require a more substantial design and implementation to achieve the SDGs effectively (UN SDG report 2019).
- One of the challenges developing countries are currently facing is to provide access to clean water to their people, especially living in rural areas (Human Development Report 2019)

2

Case study

Conference on Aligning local interventions with the UN SDGs

- Due to financial constraints, the Sri-Lankan government is unable to provide the infrastructure for clean water supply to all areas in Sri-Lanka (Wijesinghe *et al.* 2019).
- Due to lack of access to clean water in rural villages, these villagers are facing health issues and income opportunities (OCED, 2019).
- As such, Hippola village in Sri-Lanka is selected to conduct this study, given the access available from Sarvodaya organisation

3

Purpose of this study

Conference on Aligning local interventions with the UN SDGs

- To explore the development and implementation process of a clean water project in Sri-Lanka
- Design a collaborative support model using the social capital theory to assist in facilitating safe, clean and affordable water for Hippola village in Sri-Lanka (Aguilar and Sen, 2009)

4

Methodology

- This project was conducted through the Sarvodaya organisation and with the financial support of UK-Sri-Lanka organisation
- Participatory Action Learning approach has been implemented through 4 cycles (Mertler, 2017; Johnson 2008)

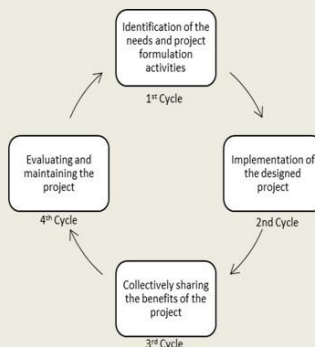


Figure 1: Participatory Action Research Cycles

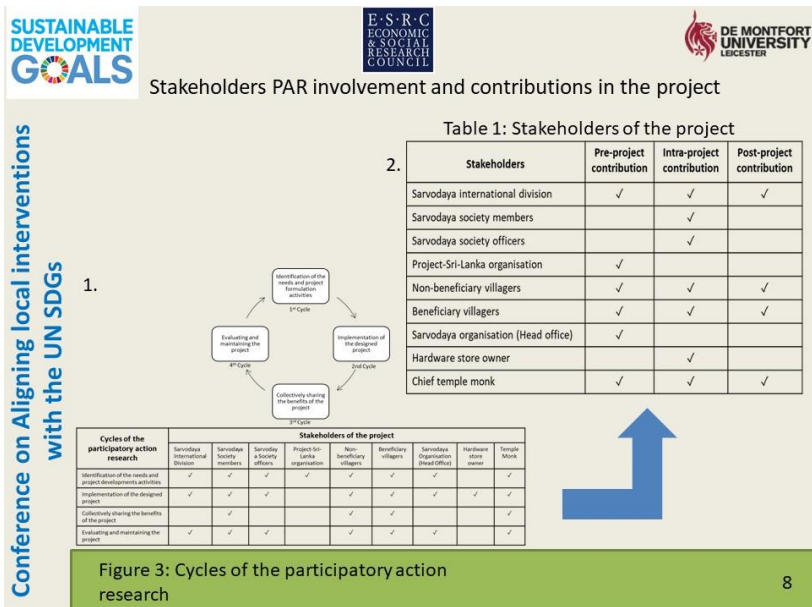
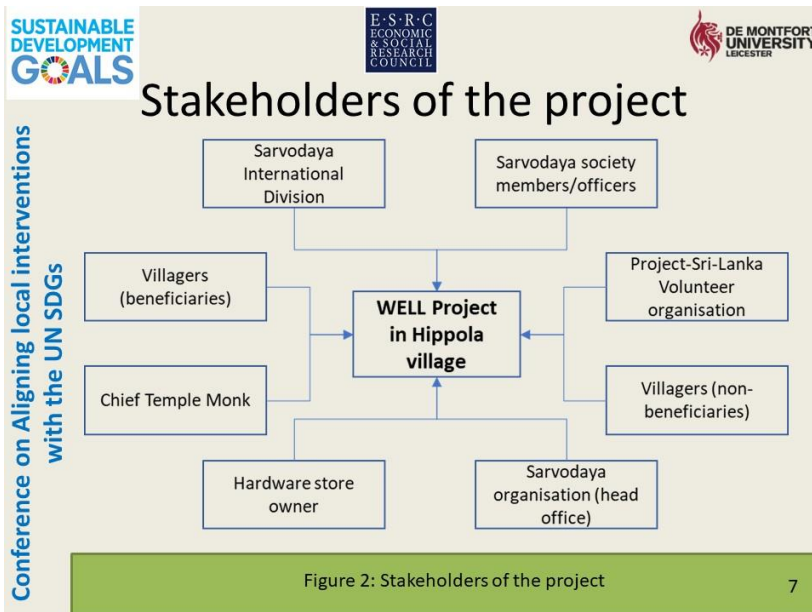
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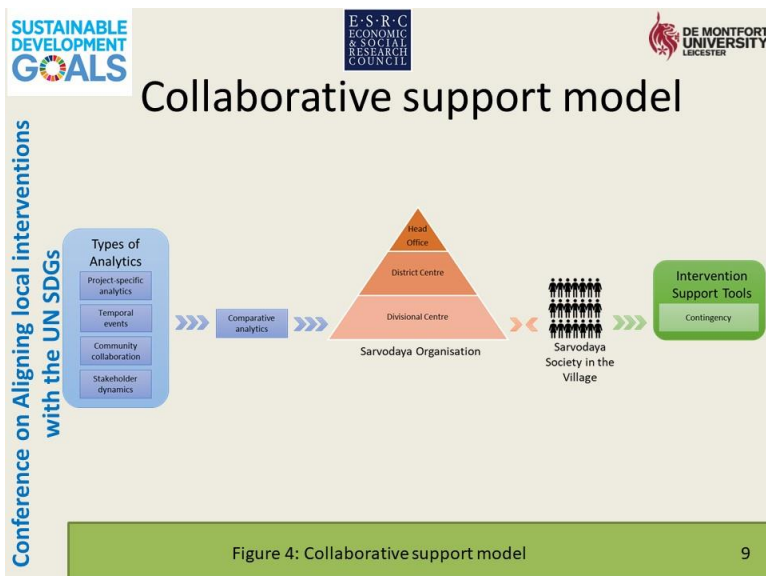
Data Collection

Data collection was conducted in three stages

- *Stage One:* In the idea generation stage, a focus group was conducted to identify the needs of the villagers. Five villagers who are members of the Sarvodaya society, including the Chief Temple Monk of the village and two representatives from the Sarvodaya organisation, participated in a focus group.
- *Stage Two:* Another focus group was conducted with different stakeholders to ensure the implementation of the clean water project.
- *Stage Three:* After the completion of the project, fifteen semi-structured interviews were conducted with ten villagers and five representatives who were involved in the project. In this stage, further insights into the participants' experiences were gathered, to assist the development of the collaborative support model.

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Conference on Aligning local interventions with the UN SDGs

Sustainable Development Goals

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Conclusion

- The success of the project has shown evidence of increase in income of most villagers in Hippola as this village is considered to be ideal for agricultural produce (SDG-1) (OCED, 2019)
- At stage four, villagers have highlighted that they feel more productive and healthier, mentally and physically since they got access to clean water (SDG-3) (OCED, 2019)

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Figure 5: Development stages of project

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