INTERNATIONAL JOURNAL OF INNOVATION, ENTERPRISE, AND SOCIAL SCIENCES

ISSN 2454-6186
Volume 6, Issue 2, Pages 458-474, November, 2026

Journal Website: https://scholarnestpublishers.com/index.php/IJIESS

PROJECT COMPLEXITY AND SUSTAINABILITY OF HUMAN IMMUNODEFICIENCY VIRUS (HIV) PREVENTION PROJECTS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

The sustainability of Human Immunodeficiency Virus (HIV) prevention projects serving key populations in Nairobi City County, Kenya, remains a concern due to technical demands and external operating conditions. This study examined the relationship between technical complexity and environmental complexity and the sustainability of key population HIV prevention projects, using the Sex Workers Outreach Programme (SWOP) Clinics. Specifically, it assessed the relationship between technical complexity and project sustainability and that between environmental complexity and project sustainability. The study was guided by Complexity Theory and Political Economy Theory and adopted a descriptive survey research design. The target population comprised 200 respondents: 100 project and service-delivery personnel and 100 SWOP clients. Personnel were selected through a census, while probability sampling was used to select clients. A total of 178 questionnaires were returned, representing an 89.0% response rate. Data were collected using structured questionnaires and key informant interviews. All constructs recorded Cronbach's alpha coefficients above 0.70. Quantitative data were analysed using descriptive statistics, Pearson correlation and multiple linear regression, while interview data were analysed thematically. Technical complexity had a positive, statistically significant relationship with project sustainability ($r = .523$, $p < .01$; $\beta = .389$, $p < .001$). Environmental complexity also had a positive, statistically significant relationship with project sustainability ($r = .521$, $p < .01$; $\beta = .276$, $p < .001$). The regression coefficients represented adjusted contributions in the original model, which controlled for stakeholder and organizational complexity. Technical complexity had the stronger adjusted association. The study concludes that coordination of integrated services, multidisciplinary collaboration and reliable information management, together with the capacity to navigate legal, political and socio-cultural conditions, are important to sustaining HIV prevention projects. It recommends strengthening technical coordination, standardizing service-delivery protocols, improving digital infrastructure and engaging political, religious and community leaders to address stigma and foster an enabling environment.

Keywords: Technical complexity, environmental complexity, project sustainability, HIV prevention projects, key populations, Nairobi City County, Kenya.

Background of the Study

Project complexity is increasingly treated as a determinant of whether projects deliver and keep their intended benefits. Systematic reviews show that the concept is defined inconsistently but is usually organized around technical, organizational and environmental dimensions (Zheng & Gu, 2023), while a meta-analysis within the technical–organizational–environmental framework has tested how these dimensions relate to project success (Hu et al., 2023). Key population Human Immunodeficiency Virus (HIV) prevention projects are demanding to run because they combine clinical services, outreach, counselling, referral and data reporting across several actors. In Kenya, HIV prevalence among female sex workers was 26.8% in the 2024 Bio-Behavioral Survey, which covered nine counties including Nairobi (NASCOP, 2025), making continuity of these services important for national prevention goals.

Across Africa, the sustainability of development programmes remains a concern, particularly in environments characterized by limited resources and institutional constraints. In Uganda, Nanyonjo et al. (2020) established that manageable project complexity and appropriate intervention design were essential for sustaining programme outcomes. However, insufficient government financing for essential commodities, weak supervision systems and limited monitoring mechanisms continued to undermine programme sustainability. These findings emphasize the importance of considering project complexity during design and implementation to improve sustainability prospects.

In Kenya, sustainability concerns are particularly pronounced in programmes serving marginalized populations, including female sex workers, whose interventions operate within environments characterized by stigma, legal challenges and social exclusion. Evidence from Nairobi demonstrates that COVID-19 curfews reduced incomes and disrupted access to HIV prevention and other health services (Gichuna et al., 2020; Kimani et al., 2020). Later qualitative work also reported reduced access to healthcare and income loss among female sex workers (Babu et al., 2024). Since early 2025, funding reductions have added pressure on key population services in Kenya (UNAIDS, 2025a).

Technical complexity relates to the sophistication of technologies, service delivery systems, multidisciplinary knowledge requirements and the level of interaction among various project components. Within key population HIV prevention projects, this form of complexity arises from the integration of healthcare services, psychosocial counselling and information management systems. The interdependence among these technical components generates implementation challenges that are often difficult to predict or standardize across different settings within Nairobi City County (Ika & Donnelly, 2017). Environmental complexity encompasses the uncertainty arising from external conditions that influence project operations, including political, legal, economic, institutional and socio-cultural factors. Within Nairobi City County, HIV prevention projects serving female sex workers operate in an environment shaped by the criminalization of sex work, widespread social stigma, fluctuating donor priorities and resistance from sections of political and religious leadership. These external conditions constrain project visibility, resource mobilization and opportunities for expansion, thereby affecting long-term sustainability (Izugbara et al., 2018).

Against this background, the study examined the relationship between technical complexity and environmental complexity and the sustainability of key population HIV prevention projects implemented through the Sex Workers Outreach Programme (SWOP) Clinics in Nairobi City County, Kenya.

Statement of the Problem

Key population Human Immunodeficiency Virus (HIV) prevention projects protect public health gains among groups that carry a disproportionate burden of infection, yet their continuity is fragile. In Kenya, HIV prevalence among female sex workers was 26.8% in the 2024 Bio-

Behavioural Survey (NASCOP, 2025). Following the 2025 funding disruptions, nearly 93% of key population-serving partners in Kenya reported full or partial service shutdowns, according to a key population-led report summarised by UNAIDS (2025c). These disruptions interrupted peer-led outreach, pre-exposure prophylaxis distribution, counselling and referral, and weakened staff retention and service quality.

Although project sustainability has been examined in previous studies, limited attention has been given to how technical and environmental complexity relate to the sustainability of key population HIV prevention projects. Technical complexity, arising from the integration of healthcare services, psychosocial counselling, livelihood enhancement and information management systems, may create implementation challenges that affect continuity of service delivery. Similarly, environmental complexity arising from external political, legal, economic, institutional and socio-cultural conditions may constrain resource mobilisation, service delivery and long-term sustainability. However, it is not sufficiently established how these two dimensions of project complexity relate to the sustainability of key population HIV prevention projects in Kenya. Without this evidence, project managers and funders may find it difficult to identify and prioritise the technical and environmental challenges that require attention when resources are limited. This study therefore examined the relationship between technical complexity and environmental complexity and the sustainability of the Sex Workers Outreach Programme (SWOP) HIV prevention project in Nairobi City County, Kenya.

Objectives of the Study

The general objective of this study was to examine the relationship between technical complexity and environmental complexity and the sustainability of key population HIV prevention projects implemented through the Sex Workers Outreach Programme (SWOP) Clinics in Nairobi City County, Kenya.

The study was guided by the following specific objectives:

i. To examine the relationship between technical complexity and the sustainability of key population HIV prevention projects in Nairobi City County, Kenya.
ii. To examine the relationship between environmental complexity and the sustainability of key population HIV prevention projects in Nairobi City County, Kenya.

Research Questions

The study was guided by the following research questions:

i. What is the relationship between technical complexity and the sustainability of key population HIV prevention projects in Nairobi City County, Kenya?
ii. What is the relationship between environmental complexity and the sustainability of key population HIV prevention projects in Nairobi City County, Kenya?

LITERATURE REVIEW

Theoretical Review

Complexity Theory

Complexity Theory originated in the natural sciences before being extended to organizational studies and project management by Stacey (2001) and later refined by Snowden and Boone (2007) through the Cynefin Framework. The theory explains that organizations and projects function within systems composed of numerous interconnected elements whose interactions are dynamic, unpredictable, and often non-linear. It classifies challenges into four domains, simple, complicated, complex, and chaotic, and argues that situations characterized by complexity cannot be effectively managed using conventional linear planning because cause-

and-effect relationships only become apparent after events have unfolded (Snowden & Boone, 2007).

A fundamental assumption of Complexity Theory is that complex systems should be understood as integrated wholes rather than as collections of isolated parts. Outcomes arise from continuous interactions among different components, making it difficult to predict behaviour using reductionist approaches. In development interventions, complexity emerges through the interaction of programme activities, stakeholders, institutional arrangements, and environmental conditions, all of which collectively shape programme performance in ways that are often uncertain and continuously evolving (Stacey, 2001). Consequently, the theory emphasizes the need to appreciate the relationships among programme elements and the wider environment within which interventions are implemented.

Within the Technical, Organizational, and Environmental (TOE) framework proposed by Bosch-Rekveldt et al. (2011), Complexity Theory provides an important basis for explaining how different forms of project complexity influence programme outcomes. Technical complexity arises from the novelty of technologies, the diversity of professional expertise required, the integration of multiple service components, and the interdependence of project activities. In key population HIV prevention projects, this complexity is reflected in the coordination of healthcare services, psychosocial support, livelihood interventions, economic empowerment initiatives, and information management systems. Since these activities are implemented by professionals from different disciplines, effective integration becomes essential, yet difficult to achieve. Such interdependencies create dynamic programme processes that are difficult to predict, standardize, or replicate across different implementation settings within Nairobi City County (Williams & Samset, 2010).

One of the major contributions of Complexity Theory is its recognition that rigid management approaches are often ineffective in environments characterized by uncertainty and continuous change. Instead, the theory advocates flexible decision-making, continuous learning, adaptation, and regular feedback throughout programme implementation (Snowden & Boone, 2007). By acknowledging the influence of contextual conditions and emergent interactions, the theory provides a valuable perspective for explaining differences in programme performance and sustainability. It further suggests that managers of complex interventions should encourage experimentation, collaborative learning, and adaptive planning instead of relying solely on predetermined implementation procedures.

Despite its strengths, Complexity Theory has several limitations. Scholars have observed that concepts such as emergence, adaptation, and non-linearity are difficult to translate into measurable variables, making practical application challenging (Stacey, 2001). The theory has also been criticized for offering limited operational guidance regarding the specific managerial actions required to address complexity. Furthermore, empirical validation of some theoretical propositions remains difficult because many of the interactions described by the theory are highly dynamic and context-dependent.

For the present study, Complexity Theory provides an appropriate lens for examining how technical complexity influences the sustainability of key population HIV prevention projects in Nairobi City County. It suggests that programmes characterized by interconnected service components and multidisciplinary implementation requirements require adaptive management capabilities, effective coordination mechanisms, and continuous learning to sustain programme outcomes over time, particularly where financial and institutional resources are constrained.

Political Economy Theory

Political Economy Theory emerged from the pioneering work of Myrdal (1957) and was later advanced within development studies by Leftwich (2000). The theory explains that development initiatives operate within environments shaped by political institutions, economic

systems, social structures, and power relations rather than in neutral settings. It maintains that the success or failure of development programmes is largely influenced by how these political and economic forces determine access to resources, institutional support, policy implementation, and organizational legitimacy (Leftwich, 2000).

The central premise of Political Economy Theory is that programme outcomes are the product of interactions among political authority, economic interests, institutional arrangements, and stakeholder influence. According to Leftwich (2000), decisions affecting development interventions are shaped by formal policies, informal norms, governance structures, and the distribution of power among actors. Consequently, programmes that overlook political and institutional realities often encounter implementation obstacles, resistance from influential actors, and difficulties in sustaining intended outcomes.

Within the Technical, Organizational, and Environmental (TOE) framework proposed by Bosch-Rekveldt et al. (2011), environmental complexity encompasses the external conditions under which projects are implemented, including legal and regulatory frameworks, economic circumstances, socio-cultural dynamics, political environments, and location-specific factors. In relation to key population HIV prevention projects in Nairobi City County, environmental complexity is reflected in the criminalization of sex work, persistent social stigma, restrictive policy environments, opposition from some political and religious groups, unpredictable donor funding patterns, and the limited political representation of programme beneficiaries. Collectively, these conditions constrain programme visibility, advocacy efforts, resource mobilization, institutional support, and opportunities for expansion, thereby affecting long-term sustainability (Scorgie et al., 2013; Izugbara et al., 2018).

A key strength of Political Economy Theory lies in its ability to demonstrate that development outcomes are shaped not only by technical interventions but also by the broader institutional and political context within which programmes function. The theory emphasizes that sustainable development requires an appreciation of governance structures, policy environments, and stakeholder interests, enabling programme managers to anticipate institutional barriers and develop appropriate engagement strategies (Leftwich, 2000). It further underscores the importance of coalition building, policy advocacy, and constructive engagement with decision-makers as essential mechanisms for enhancing programme sustainability.

Despite its strengths, the theory has been criticized for placing substantial emphasis on structural and institutional constraints, sometimes underestimating the capacity of organizations and individuals to influence or transform their operating environments. Critics also argue that the complexity of political and economic interactions makes the theory difficult to operationalize empirically, while the context-specific nature of political economy relationships limits the generalizability of its propositions across different settings (Leftwich, 2000).

In the present study, Political Economy Theory provides an appropriate lens for examining how environmental complexity influences the sustainability of key population HIV prevention projects in Nairobi City County. It supports the proposition that legal frameworks, political institutions, economic conditions, and socio-cultural influences shape programme sustainability. The theory further suggests that programmes operating within politically and socially complex environments are more likely to achieve long-term sustainability when they actively manage institutional relationships, engage influential stakeholders, advocate for supportive policies, and adapt strategically to changes within the external environment.

Conceptual Framework

A conceptual framework is a structured model that identifies and explains the key variables investigated in a study and illustrates the expected relationships among them. It is developed

from established theories, empirical literature, and relevant concepts that provide a basis for understanding how the variables interact in addressing the research problem. The framework serves as a guide for the entire research process by clarifying the independent and dependent variables and demonstrating the presumed direction of their relationships. The conceptual framework proposes that technical complexity and environmental complexity are associated with the sustainability of key population HIV prevention projects.

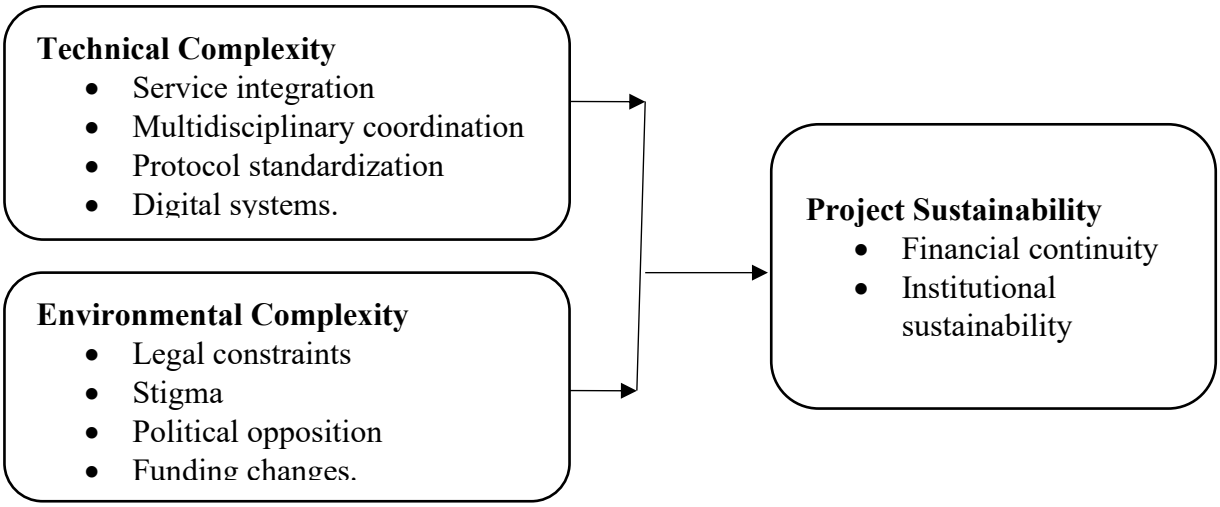


Figure 2.1: Conceptual Framework

Technical Complexity

Technical complexity refers to the coordination of different service components, professional expertise and information systems required for project implementation. In HIV prevention projects, it arises from integrating clinical services, psychosocial support and peer-led interventions. Beattie et al. (2024) highlight the importance of comprehensive HIV prevention services, while Salas-Ortiz et al. (2024) emphasize management capacity in community-based HIV service organizations. Ndisha et al. (2023) further demonstrate the role of electronic information systems in monitoring and coordinating HIV interventions. Accordingly, technical complexity was assessed through service integration, multidisciplinary collaboration and project information management.

Environmental Complexity

Environmental complexity refers to external conditions that influence project implementation and sustainability, particularly legal, political and socio-cultural factors. Woensdregt (2022) and Beattie et al. (2024) demonstrate how criminalization and restrictive conditions affect HIV prevention initiatives serving sex workers. Neel et al. (2024) highlight the importance of political commitment and advocacy in sustaining HIV programmes, while Mbote et al. (2020) identify stigma and discrimination as barriers to healthcare access. The study therefore assessed environmental complexity through the legal and regulatory environment, political environment and socio-cultural context.

Sustainability of Key Population HIV Prevention Projects

Project sustainability refers to the capacity to maintain essential project activities, institutional arrangements and service outcomes over time. In this study, it was assessed through financial continuity, reflecting the availability and predictability of resources to support project activities, and institutional sustainability, reflecting the integration of services into established systems, governance arrangements, staff capacity and accountability mechanisms (WHO, 2022; Salas-Ortiz et al., 2024).

Empirical Review of Literature

Technical Complexity and Project Sustainability

The reviewed literature identifies technical complexity as an important consideration in project sustainability. Studies indicate that projects involving interconnected systems, multidisciplinary teams and integrated service components often experience implementation and coordination challenges that affect their long-term sustainability. Worsley (2020), Taylor and Francis (2020), and Nanyonjo et al. (2020) emphasize the importance of adaptive management, effective coordination, continuous learning, technical capacity and institutional support in sustaining complex projects.

In Kenya, studies by Muthee (2020), Pkassan and Kimutai (2020), Ndombi et al. (2020), and Undugu Society of Kenya (2021) highlight the importance of project design, staff capacity, service integration and adequate resources in sustaining development and HIV prevention interventions. However, limited empirical attention has been given to the specific relationship between technical complexity and the sustainability of HIV prevention projects targeting key populations.

Environmental Complexity and Project Sustainability

The reviewed literature demonstrates that legal restrictions, stigma, discrimination, political conditions, economic insecurity and institutional barriers influence the implementation and continuity of programmes serving sex workers. Studies conducted in Nairobi and Mombasa highlight how restrictive policies, social exclusion, violence and disruptions associated with the COVID-19 pandemic constrained access to services and programme operations.

KESWA (2021), PubMed (2020), Springer (2020), and Undugu Society of Kenya (2021) further illustrate how structural and external conditions affect programme effectiveness and sustainability. Other findings emphasize the importance of local partnerships and adaptive strategies in responding to changing environmental conditions. Nevertheless, these studies do not sufficiently establish the specific relationship between environmental complexity and the sustainability of key population HIV prevention projects in Nairobi City County.

Summary of Empirical Literature and Knowledge Gaps

Overall, the empirical literature identifies technical and environmental complexity as relevant dimensions of project sustainability. However, two key gaps emerge. First, limited empirical research has examined technical complexity and environmental complexity as distinct dimensions influencing project sustainability. Second, there is insufficient contextual evidence concerning their relationship with the sustainability of HIV prevention projects serving key populations in Nairobi City County. The present study addresses these gaps by examining the relationship between the two dimensions and the sustainability of HIV prevention projects implemented through SWOP Clinics.

RESEARCH METHODOLOGY

The study employed a descriptive survey research design to examine the relationship between project complexity and sustainability of key population HIV prevention projects in Nairobi City County, Kenya. The design was appropriate because technical complexity, environmental complexity and project sustainability were existing conditions that could not be manipulated by the researcher. It also enabled the collection of data from different respondent groups using standardized instruments and the examination of relationships among the study variables.

The study was conducted through the Sex Workers Outreach Programme (SWOP) Clinics in Nairobi City County. SWOP was treated as one bounded HIV prevention project because its clinics operate under shared management, a common funding arrangement and a defined package of services, including HIV testing, pre-exposure prophylaxis, sexually transmitted

infection services, condoms, counselling and peer outreach. The study covered five clinics: SWOP Korogocho, SWOP Kibra, SWOP Kawangware, SWOP City and SWOP Majengo. The unit of analysis was the SWOP HIV prevention project, while the units of observation comprised clinic doctors, nurses, counsellors, County Health Management Team officers, National AIDS and STI Control Programme (NASCOP) technical personnel and eligible adult SWOP clients.

The study targeted 200 respondents, comprising 100 project and service-delivery personnel and 100 eligible SWOP clients. A census approach was adopted for the 100 personnel, while a probability sampling approach was used to select 100 clients. The client sample was determined using Cochran's formula for a large or undetermined population, based on a 95% confidence level, maximum variability of 0.50 and a 10% margin of error. The calculated minimum sample of 96.04 was rounded upward to 100 respondents, giving a total sample of 200.

Primary data were collected using a structured questionnaire administered through both the drop-and-collect approach and Google Forms. The questionnaire contained demographic items and statements measuring technical complexity, environmental complexity and project sustainability. Responses were rated on a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). Key informant interviews were also incorporated to provide further explanation of patterns emerging from the questionnaire data.

Data collection commenced after obtaining the necessary university authorization, ethical clearance, research permit from the National Commission for Science, Technology and Innovation (NACOSTI), and relevant organizational permissions. Completed questionnaires were checked for completeness, coded and entered into Statistical Package for Social Sciences (SPSS) Version 29 for analysis. Descriptive statistics, including frequencies, percentages, means and standard deviations, were used to summarize respondents' characteristics and responses. Pearson's Product-Moment Correlation analysis was used to establish the strength and direction of the relationships between technical complexity, environmental complexity and project sustainability. Multiple linear regression analysis was further employed to determine the contribution of the project complexity dimensions to sustainability. The results were presented using tables and figures.

RESEARCH RESULTS AND DISCUSSIONS

The study targeted a sample of 200 respondents, comprising 100 project and service-delivery staff and 100 eligible SWOP clients. Out of the 200 questionnaires administered, 178 were duly completed and returned, while 22 were either not returned or were incompletely filled. This yielded a response rate of 89.0%

Descriptive Analysis

Descriptive analysis was undertaken to examine respondents' perceptions regarding technical complexity, environmental complexity and project sustainability. A five-point Likert scale was used, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree. The findings are presented using means and standard deviations, alongside relevant thematic findings from key informant interviews and comparisons with previous empirical studies.

Technical Complexity and Project Sustainability

Respondents evaluated eight statements relating to service integration, multidisciplinary coordination, technical interdependence, information management and service delivery systems. The findings are presented in Table 1.

Table 1: Descriptive Statistics for Technical Complexity

Statement	Mean	Std. Dev.
The project integrates clinical, psychosocial and community outreach services.	4.52	0.712
Delivery of the project requires professionals from different disciplines.	4.48	0.698
Coordination among professionals involved in service delivery is necessary for effective project implementation.	4.36	0.834
Changes in one service component require adjustments in other project activities.	4.41	0.756
The project adapts evidence-based HIV prevention interventions to the needs of the population served.	4.28	0.812
Standardized clinical and service-delivery protocols are used across the project's service points.	4.33	0.768
Digital systems support client records, service monitoring and project reporting.	3.87	1.124
Technical support and staff training are available when new prevention interventions or systems are introduced.	4.15	0.892
Aggregate Mean	**4.30**	**0.825**

Source: Field Data (2026)

The findings in Table 1 indicate that technical complexity was strongly evident in the implementation of key population HIV prevention projects, as reflected by an aggregate mean of 4.30 (SD = 0.825). Integration of clinical, psychosocial and community outreach services recorded the highest mean (M = 4.52, SD = 0.712), followed by the involvement of professionals from different disciplines (M = 4.48, SD = 0.698). Changes in one service component also required adjustments in other project activities (M = 4.41, SD = 0.756), demonstrating the interdependence of project activities.

The high rating for service integration is consistent with Beattie et al. (2024), who described SWOP Clinics as providing a comprehensive package of HIV prevention and treatment services to female sex workers in Nairobi. It also corresponds with Salas-Ortiz et al. (2024), whose assessment of community-based organizations providing HIV services to key populations in Kenya and Malawi highlighted the management demands associated with delivering multiple services. These studies reinforce the observation that integrated HIV prevention interventions require coordination of different service components, personnel and operational processes. The present findings extend this understanding by demonstrating that service integration is a prominent feature of the technical complexity experienced within the SWOP project.

The importance of multidisciplinary coordination is further supported by Ika and Donnelly (2017), who established that projects involving integrated and technically demanding interventions require specialized expertise, organizational capacity and continuous coordination. Similarly, Nanyonjo et al. (2020) identified intervention design and manageable levels of technical complexity as important considerations in sustaining integrated community case management programmes in Uganda. Their findings also highlighted weak supervision and limited monitoring mechanisms as challenges affecting programme sustainability. The present study therefore supports the view that technical complexity is not solely determined by the number of services delivered but also by the extent to which different professional competencies and activities must be coordinated to maintain service continuity.

Digital systems supporting client records, service monitoring and project reporting recorded the lowest mean (M = 3.87, SD = 1.124), suggesting comparatively weaker and less consistent perceptions of digital support. This finding is relevant to Ndisha et al. (2023), who examined Kenya's National Data Warehouse for HIV programming and demonstrated the contribution of electronic medical records to service information integration, monitoring and data-driven decision-making. Although their study focused on the national information system rather than SWOP project sustainability, it underscores the importance of reliable information management in coordinating and monitoring HIV interventions. The comparatively lower rating in the present study suggests that the availability and effective use of digital systems may not be uniform across service delivery operations.

Environmental Complexity and Project Sustainability

Environmental complexity was assessed using eight statements relating to legal and regulatory requirements, political conditions, socio-cultural factors, security and economic conditions. The descriptive findings are presented in Table 2.

Table 2: Descriptive Statistics for Environmental Complexity

Statement	Mean	Std. Dev.
Legal and regulatory requirements affect the implementation of HIV prevention services for key populations.	4.66	0.167
Legal and policy conditions affect the project's outreach and community engagement activities.	4.61	0.623
Stigma and discrimination affect the willingness of some clients to access project services.	4.58	0.681
Community attitudes towards key populations affect project acceptance and reach.	4.52	0.712
Political or religious opposition affects the implementation of some project activities.	4.44	0.756
Security conditions affect the planning and delivery of community outreach activities.	4.36	0.834
Changes in donor funding conditions create uncertainty for project planning.	3.59	1.397
Changes in the cost of goods and services affect project resource requirements.	3.27	1.436
Aggregate Mean	**4.25**	**0.826**

Source: Field Data (2026)

The findings in Table 2 indicate that environmental complexity was a prominent feature of project implementation, with an aggregate mean of 4.25 (SD = 0.826). Legal and regulatory requirements recorded the highest mean (M = 4.66, SD = 0.167), followed by the influence of legal and policy conditions on outreach and community engagement (M = 4.61, SD = 0.623). Stigma and discrimination also recorded a high mean (M = 4.58, SD = 0.681), indicating that socio-cultural conditions influence beneficiaries' willingness to access project services. Community attitudes towards key populations (M = 4.52, SD = 0.712) and political or religious opposition (M = 4.44, SD = 0.756) further demonstrate the influence of the external operating environment on project implementation.

The high rating for legal and regulatory requirements is consistent with Scorgie et al. (2013) and Izugbara et al. (2018), who examined the structural and institutional conditions affecting sex workers in sub-Saharan Africa and documented how restrictive legal environments and social stigma create barriers to access, rights and service delivery. Similarly, Woensdregt (2022), examining sex workers' experiences in Nairobi, Mombasa, Kisii and Meru, found that

criminal laws relating to sex work and same-sex activities, together with social stigma, contributed to vulnerability and restricted access to rights and social justice. Beattie et al. (2024) also identified criminalization and other structural conditions as important factors shaping HIV vulnerability among female sex workers in Nairobi. These findings support the present observation that the legal and regulatory environment has implications beyond compliance, extending to project visibility, outreach, beneficiary access and continuity of services.

The influence of stigma and discrimination is further supported by Mbote et al. (2020), who found that police discrimination, misconduct and stigma were associated with delayed or avoided healthcare utilization and lower consistent condom use among female sex workers in Kenya. Beattie et al. (2024) similarly documented substantial experiences of sex-work stigma among female sex workers in Nairobi. The high mean recorded for stigma and discrimination in the present study suggests that such conditions remain relevant to the implementation of HIV prevention interventions. When beneficiaries are reluctant to access services because of anticipated discrimination or negative social attitudes, projects may experience difficulties maintaining service uptake, community outreach and consistent engagement with their intended populations.

The findings on political or religious opposition are also consistent with Political Economy Theory's emphasis on the influence of political institutions, power relations and social structures on development programme outcomes. Leftwich (2000) argued that programme implementation is shaped by formal policies, informal norms, governance structures and the distribution of power among actors. In the context of key population HIV prevention projects, opposition from influential political or religious actors may affect institutional support, policy implementation and the legitimacy of interventions. The present findings therefore demonstrate the importance of considering political and socio-cultural conditions when assessing the sustainability of projects serving marginalized populations.

Changes in donor funding conditions ($M = 3.59$, $SD = 1.397$) and the cost of goods and services ($M = 3.27$, $SD = 1.436$) recorded comparatively lower means and greater variability in respondents' perceptions. Nevertheless, these findings remain relevant to the sustainability of donor-supported HIV prevention interventions. Nanyonjo et al. (2020) identified insufficient government financing for essential commodities as one of the challenges affecting the sustainability of integrated community case management programmes in Uganda. More recently, UNAIDS (2025) highlighted the vulnerability of community-led HIV prevention interventions to funding disruptions. These studies demonstrate how changes in external financing conditions can create uncertainty for project planning and continuity, although respondents in the present study perceived legal and socio-cultural conditions as more prominent environmental challenges.

Project Sustainability

Project sustainability was the dependent variable and was assessed through financial continuity and institutional sustainability. Respondents evaluated eight statements relating to funding arrangements, institutional integration, governance, staff retention and service quality. The findings are presented in Table 3.

Table 3: Descriptive Statistics for Project Sustainability

Statement	Mean	Std. Dev.
The project has access to more than one source of financial support.	4.52	0.712
Funding arrangements provide reasonable predictability for project planning.	4.44	0.756
The project has arrangements for financing essential activities beyond the current funding period.	4.36	0.834
Project activities are integrated into established organizational or public health systems.	4.61	0.623
The project has documented procedures to guide continued service delivery.	4.28	0.867
The project has established governance and accountability mechanisms.	4.32	0.812
The project retains personnel with the skills required to maintain essential services.	3.87	1.124
The project maintains appropriate service quality across its service points.	3.27	1.436
Aggregate Mean	**4.21**	**0.896**

Source: Field Data (2026)

The findings in Table 3 indicate generally favourable perceptions of project sustainability, with an aggregate mean of 4.21 (SD = 0.896). Integration of project activities into established organizational or public health systems recorded the highest mean (M = 4.61, SD = 0.623), followed by access to more than one source of financial support (M = 4.52, SD = 0.712). Funding predictability (M = 4.44, SD = 0.756) and arrangements for financing essential activities beyond the current funding period (M = 4.36, SD = 0.834) were also positively rated.

The high rating for institutional integration is consistent with the WHO (2022), which emphasizes the importance of equitable, acceptable and community-led services for key populations, including the institutional support required to sustain service delivery. Salas-Ortiz et al. (2024) also identified people management, performance monitoring and community engagement as important management domains among community-based organizations providing HIV services in Kenya and Malawi. These findings demonstrate that institutional sustainability requires more than the continued existence of project activities; it also involves embedding appropriate management arrangements, service-delivery procedures and accountability mechanisms within established systems.

The positive perceptions of financial support and funding predictability are important given the dependence of many key population HIV prevention interventions on external financing. However, the comparatively lower ratings for staff retention (M = 3.87, SD = 1.124) and maintenance of appropriate service quality (M = 3.27, SD = 1.436) suggest that institutional and financial arrangements do not necessarily translate into equally consistent service delivery. This observation is relevant to UNAIDS (2025), which highlighted the vulnerability of community-led HIV prevention services to funding disruptions. It also reflects Nanyonjo et al. (2020), who identified inadequate government financing, weak supervision and limited monitoring mechanisms as constraints to sustaining integrated community health programmes.

Correlation Analysis

Pearson correlation analysis was conducted to establish the direction and strength of the relationships between technical complexity, environmental complexity and project sustainability. The analysis focused on the two dimensions retained for the article. The results are presented in Table 4.

Table 4: Correlation Matrix for Technical Complexity, Environmental Complexity and Project Sustainability

Variables	Project Sustainability	Technical Complexity	Environmental Complexity
Project Sustainability	1		
Technical Complexity	.523**	1	
Environmental Complexity	.521**	.198	1

Note: ** Correlation is significant at the 0.01 level (2-tailed). *Source: Field Data (2026).*

The findings in Table 4 indicate a positive and statistically significant relationship between technical complexity and project sustainability ($r = .523$, $p < .01$). This suggests that higher levels of technical complexity were associated with higher reported levels of project sustainability. Environmental complexity also had a positive and statistically significant relationship with project sustainability ($r = .521$, $p < .01$). The strength of the two relationships was comparable, although technical complexity had a marginally higher correlation coefficient.

The positive relationship between technical complexity and project sustainability is consistent with Ika and Donnelly (2017), who emphasized the importance of technical expertise, coordination and management capacity in complex project implementation. It also relates to Nanyonjo et al. (2020), whose findings highlighted the importance of supervision and monitoring mechanisms in sustaining integrated community health programmes. In the context of the present study, these findings suggest that the capacity to coordinate integrated services, manage technical interdependencies and maintain appropriate information systems is relevant to sustaining HIV prevention interventions.

The relationship between environmental complexity and project sustainability is consistent with studies highlighting the influence of legal, institutional and socio-cultural conditions on HIV prevention interventions for key populations. Scorgie et al. (2013), Izugbara et al. (2018) and Beattie et al. (2024) documented how restrictive legal environments, stigma and discrimination affect the operating conditions and accessibility of services for sex workers. Mbote et al. (2020) also associated discriminatory experiences with delayed or avoided healthcare utilization among female sex workers in Kenya. The present correlation findings extend this evidence by demonstrating a positive association between the environmental conditions examined in the study and respondents' assessments of project sustainability. The direction of this relationship should, however, be interpreted in light of how environmental complexity was measured and coded; the correlation does not by itself establish that more adverse external conditions improve sustainability.

Multiple Regression Analysis

Multiple linear regression analysis was used to examine the predictive contribution of technical complexity and environmental complexity to project sustainability. The original regression model included all four project complexity dimensions: technical, stakeholder, organizational and environmental complexity. For this article, technical and environmental complexity are the focal predictors, while stakeholder and organizational complexity are retained as adjustment variables.

Table 5: Regression Coefficients for Technical and Environmental Complexity

Variable	B	Std. Error	Standardized Beta (β)	t	Sig.
Technical Complexity	.412	.065	.389	6.338	.000
Environmental Complexity	.298	.058	.276	5.138	.000

Dependent variable: Project Sustainability. Source: Field Data (2026).

The regression coefficients indicate that technical complexity had a positive and statistically significant adjusted contribution to project sustainability ($\beta = .389$, $t = 6.338$, $p < .001$). This was the strongest contribution among the four predictors in the original model. The result suggests that, holding the other complexity dimensions constant, improvements in the management of technical aspects of project implementation were associated with higher levels of project sustainability. This finding is consistent with Ika and Donnelly (2017), who emphasized the importance of technical expertise and coordination in managing complex projects. It also supports Nanyonjo et al. (2020), who identified supervision, monitoring and implementation capacity as relevant to sustaining integrated community health programmes. In the SWOP project context, the finding highlights the importance of coordinating multidisciplinary service delivery, managing interdependent interventions, maintaining standardized procedures and strengthening information management systems. These technical capabilities are particularly relevant where several service components must operate together to ensure continuity of HIV prevention services.

Environmental complexity also had a positive and statistically significant adjusted contribution to project sustainability ($\beta = .276$, $t = 5.138$, $p < .001$). It was the second strongest predictor in the original model. This indicates that environmental complexity contributed significantly to explaining project sustainability after accounting for technical, stakeholder and organizational complexity. The finding is relevant to Scorgie et al. (2013), Izugbara et al. (2018) and Beattie et al. (2024), whose studies highlighted the influence of legal and socio-cultural conditions on HIV prevention services for sex workers and other key populations. Mbote et al. (2020) similarly demonstrated how discriminatory experiences can affect healthcare utilization among female sex workers in Kenya. These studies provide context for understanding why the external environment matters to the continuity of HIV prevention interventions. Legal restrictions, stigma, community attitudes and political opposition can influence project visibility, beneficiary access, outreach activities and institutional support. The present regression result indicates that environmental complexity remained a significant predictor even when the other project complexity dimensions were taken into account.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the study findings, the study concludes that technical complexity is significantly related to the sustainability of key population HIV prevention projects in Nairobi City County. The significant positive relationship confirms that projects with highly interconnected service components, multidisciplinary coordination demands, and innovative biomedical prevention approaches tend to achieve higher levels of sustainability. The existence of well-coordinated clinical, psychosocial, and outreach components, supported by specialized training, is associated with stronger project outcomes. However, the value of technical complexity is fully realized only when it is actively managed through reliable digital infrastructure, standardized protocols, and effective coordination across service delivery points. Projects must therefore transition from treating technical demands as operational burdens to managing them as capabilities that guide service integration across the project. This conclusion was informed by the finding that technical complexity had a positive and statistically significant relationship

with project sustainability and was the strongest predictor of the four dimensions, and by the interview evidence on coordinating service components, unreliable digital systems and uneven protocol standardization.

The study concludes that environmental complexity is significantly related to the sustainability of key population HIV prevention projects in Nairobi City County. The significant positive relationship, supported by qualitative evidence of legal restrictions, stigma, political and religious opposition, and security concerns, confirms that projects operating in complex external environments tend to develop adaptive strategies that enhance their sustainability. However, the qualitative finding that criminalization limits visibility and that security risks disrupt outreach indicates that the capacity to manage legal and social hostility remains an area requiring attention. Projects that actively manage institutional relationships, engage community and political leaders, and adapt strategically to changes in the external environment are better positioned to achieve consistent and long-term service delivery. This conclusion was informed by the finding that environmental complexity had a positive and statistically significant relationship with project sustainability, and by the interview evidence of criminalization, stigma, political and religious opposition and security risks during outreach.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are made in relation to the four dimensions of project complexity examined.

Technical Complexity

The study recommends the following measures to manage technical complexity:

i. Project managers should establish clear operating procedures for managing changes across the interconnected clinical, psychosocial and community outreach components, so that an adjustment in one component does not disrupt continuity of care.

ii. Project managers should standardize clinical protocols across service delivery points, irrespective of differences in staffing levels and available resources.

iii. Implementing organizations should invest in reliable digital infrastructure and adequate equipment, and should keep alternative data management arrangements for use when electronic platforms fail.

iv. Implementing organizations should provide regular staff training and supportive supervision on emerging biomedical HIV prevention approaches and on the use of digital health systems.

v. The Ministry of Health, NASCOP and the Nairobi City County Government should develop and implement standardized guidelines for digital health systems, including interoperability and data protection measures.

Environmental Complexity

The study recommends the following measures to manage environmental complexity:

i. Project managers should engage political, religious and community leaders to promote understanding of key population health needs and to reduce stigma and discrimination.

ii. Project managers should work with civil society organizations and relevant government institutions to advocate for supportive policies and administrative arrangements that facilitate access to HIV prevention services.

iii. Implementing organizations should establish security protocols for staff and clients, particularly during night outreach and activities in potentially unsafe locations.

iv. Implementing organizations should develop contingency plans to respond to changes in legal, regulatory, political and social conditions that may disrupt service delivery.

v. The Ministry of Health and the Government of Kenya should strengthen policy engagement with relevant stakeholders to promote an enabling environment, and donors and development partners should support interventions that reduce stigma and strengthen the capacity of implementing organizations to adapt to changing external conditions.

REFERENCES

Academic. (2024). *Sex worker livelihoods and adaptation during COVID-19*. Academic Press.

Babu, K. M., Mutua, S. M., & Odhiambo, J. O. (2024). Environmental challenges and structural barriers in key population health interventions in urban Kenya. *Journal of Health Care for the Poor and Underserved, 35*(2), 541–558.

Beattie, T. S., Bhattacharjee, P., Isac, S., Mohan, H. L., & Ramesh, B. M. (2024). Complex clinical and community-led interventions for HIV prevention among female sex workers. *The Lancet HIV, 11*(4), e265–e278.

Bosch-Rekveldt, M., Jongkind, Y., Mooi, H., Bakker, H., & Verbraeck, A. (2011). Grasping project complexity in large engineering projects: The TOE (Technical, Organizational and Environmental) framework. *International Journal of Project Management, 29*(6), 728–739. https://doi.org/10.1016/j.ijproman.2010.07.008

Ika, L. A., & Donnelly, J. (2017). Success conditions for international development capacity building projects. *International Journal of Project Management, 35*(1), 44–63.

Izugbara, C. O., Egesa, C., & Okal, J. (2018). Sex work, stigma and health services in Kenya: A qualitative study. *Culture, Health & Sexuality, 20*(8), 910–924.

Izugbara, C. O., Wekesa, E., & Nakamura, Y. (2018). HIV prevention programmes for female sex workers in Kenya: A review of the evidence. *African Journal of AIDS Research, 17*(3), 245–258.

Kenya Sex Workers Alliance. (2021). *Structural factors contributing to violence against sex workers in Kenya*. KESWA.

Kimani, J., Mwangi, P., & Goldenberg, T. (2020). Navigating the legal and structural environment of sex work and HIV prevention in Kenya. *Sexually Transmitted Infections, 96*(5), 342–347.

Kwale District Study. (2020). *Sustainability of donor-supported projects in Ghana*. Kwale District Development Report.

Leftwich, A. (2000). *States of development: On the primacy of politics in development*. Polity Press.

Mboté, S., Kimani, J., & Kaai, S. (2020). Police discrimination, stigma, and healthcare utilization among female sex workers in Kenya. *Journal of Health and Social Behavior, 61*(4), 389–406.

MES Port Elizabeth Poverty Alleviation Program. (2020). *Complexity theory and sustainable development interventions*. MES.

Myrdal, G. (1957). *Economic theory and under-developed regions*. Duckworth.

Nanyonjo, A., Ssekabira, U., & Oporia, F. (2020). Technical complexity and service delivery bottlenecks in decentralized health interventions. *Health Policy and Planning, 35*(6), 670–682.

Ndisha, M., Kyalo, D., & Mulwa, A. (2023). Technical and operational complexities in managing public health interventions in Kenya. *Journal of Health Management, 25*(2), 230–245.

Ndombi, J., Kyalo, D., & Mulwa, A. (2020). Stakeholder participation and performance of non-governmental HIV/AIDS projects in Kenya. *International Academic Journal of Information Sciences and Project Management, 3*(5), 112–130.

Neel, A. H. (2024). Managing complexity in multi-tiered public health programs: A framework for sustainable interventions. *Systems Research and Behavioral Science, 41*(1), 85–102.

Pkassan, D., & Kimutai, G. (2020). Project design and sustainability of World Vision community development projects in North Rift, Kenya. *International Journal of Project Management and Development, 5*(3), 45–62.

PubMed. (2020). *Effects of COVID-19 on the health and socio-economic well-being of sex workers in Nairobi*. PubMed Central.

Salas-Ortiz, A., Opuni, M., Rodríguez-Atristain, A., Figeroa, J. L., Sánchez-Morales, J. E., Bula, A. K., Nyambura, B., & Bautista-Arredondo, S. (2024). Management practices in facilities providing HIV services to key populations in Kenya and Malawi: A descriptive analysis of management in community-based organizations. *PLOS Global Public Health, 4*(3), Article e0002813. https://doi.org/10.1371/journal.pgph.0002813

Scorgie, F., Nakato, D., Harper, E., Richter, M., Maseko, S., Nare, P., Smit, J., & Chersich, M. (2013). "We are despised in the hospitals": Sex workers' experiences of accessing health care in four African countries. *Culture, Health & Sexuality, 15*(4), 450–465. https://doi.org/10.1080/13691058.2012.763187

Snowden, D. J., & Boone, M. E. (2007). A leader's framework for decision making. *Harvard Business Review, 85*(11), 68–76.

Springer. (2020). *Young women's access to sexual and reproductive health programmes in Mombasa, Kenya*. Springer Nature.

Stacey, R. D. (2001). *Complex responsive processes in organizations: Learning and knowledge creation*. Routledge.

Taylor & Francis. (2020). *Collaborative project networks and sustainability in European educational programmes*. Taylor & Francis.

UNAIDS. (2025). *Global AIDS update 2025*. Joint United Nations Programme on HIV/AIDS.

UNAIDS. (2025a). *Kenya HIV prevention and funding disruptions report*. Joint United Nations Programme on HIV/AIDS.

UNAIDS. (2025c, May 13). *Community-led HIV services under threat: Global networks and UNAIDS track the impacts of the US funding cuts*. Joint United Nations Programme on HIV/AIDS. https://unaids.org/en/resources/presscentre/featurestories/2025/may/20250512_community-led-services

Undugu Society of Kenya. (2021). *Rehabilitation initiatives targeting female commercial sex workers in Nairobi County*. Undugu Society of Kenya.

WHO. (2022). *Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: Recommendations for a public health approach*. World Health Organization.

Williams, T., & Samset, K. (2010). Issues in front-end decision making on projects. *Project Management Journal, 41*(2), 38–49.

Woensdregt, L. (2022). Sex workers' experiences of violence and access to justice in Kenya: The role of criminal law and social stigma. *Journal of Law and Society, 49*(3), 456–478.

Worsley, L. (2020). *Complexity in large-scale infrastructure projects: A framework for understanding sustainability outcomes*. University of Chicago Press..