



# **SOCIAL INNOVATION STRATEGY AND SUSTAINABILITY: A PATH ANALYSIS OF PHARMACEUTICAL DISTRIBUTORS IN NAIROBI CITY, KENYA**

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## **Abstract**

*This study reports empirical findings of a survey conducted among pharmaceutical distributors serving informal settlement areas in Nairobi city county in Kenya. The pharmaceutical distributors face several challenges when serving these areas calling the management of the distributors to resort to social innovation as a viable strategy for business survival. The concern however is how sustainable such a strategy is to the survival of the business undertaken by the pharmaceutical distributors. The study was guided by the postulates of the Three Cycle and Tripple Bottom Line models to answer three objectives that sought to address the levels of adoption of social innovation strategy and that of sustainability attained as well as the effect of the level of social innovation strategy on the level of sustainability attained. The study drew its population from 30 pharmaceutical distributors targeting informal settlement areas in Nairobi and obtained primary data from managers heading 7 key departments in each distributor. The study was responded to by 168 managers from 30 pharmaceutical distributors representing*

80.4% response rate. Two components of social innovation extracted through Exploratory Factor Analysis were found to be practiced to a moderate extent ( $M=3.6$ ;  $SD=1.36$ ) and contributed to high level of sustainability ( $M=3.808$ ;  $S. D=1.025$ ). A path analysis constructed using structural equation modelling indicated that the two components of social innovation have varying degrees of contribution to the three pillars of sustainability (planet, people & profit) with the highest being that on planet and the least on profit. Overall, social innovation has a negative effect on sustainability ( $\beta=-0.13$ ;  $p<0.05$ ). The findings provide useful insights on the role of social innovation as a viable strategy for the sustainability of the pharmaceutical industry and calls on future research to makes suggestions on how it can be deployed to enhance sustainability in the pharmaceutical industry.

*Keywords: Social Innovation Strategy; Sustainability; Informal settlements; Pharmaceutical distributors*

## INTRODUCTION

The pharmaceutical sector is positioned in a unique way to offer value to society since its inventions and innovations act as foundations for prosperity leading to the attainment of universal health. Globally, a rise in the need for pharmaceutical products has been noted, emanating from the growth in the global population that has resulted in an increase in new conditions and diseases (Zarei *et al.*, 2020). Sustainability is a key aspect of the pharmaceutical industry's modern-day business. Halla and Binder (2020) observe that only a few industries have completely invested in improving quality of life like the pharmaceutical sector. It has been suggested that by focusing on the triple-bottom-line approach, organizations can achieve sustainability at both organizational and societal levels (Geissdoerfer *et al.*, 2018). Chaturvedi *et al.* (2017) note that sustainability is not just limited to environmentally friendly measures; it is also about improving the financial and social impact of a business. This concern can be well addressed in the pharmaceutical industry, whose main objective is to deliver medicines and other health care products to enable members of society to live healthier, longer, and fuller lives. Thus, innovative approaches are required to meet sustainability objectives.

From a societal point of view, Roy *et al.* (2021) defines sustainability as the process of meeting the needs of society through the deployment of business strategies, processes, and activities that protect the resources required in the future. At an organizational level sustainability refers to the long-term economic prosperity of an organization and stakeholder management aspects in the organization's activities (Oluoko-Odingo & Mutisya, 2019). There has been a growing focus and interest in sustainability by global bodies, regional institutions,

and national governments. Thus, through research and development, a suitable plan can be developed to address the industry's challenges, especially regarding sustainability. Through the operations of the industry that seek to achieve this goal by producing drugs and other pharmaceutical products, the industry players cannot only fulfill their business objectives but also achieve those societal concerns for sustainability (Halla & Binder, 2020). However, for certain reasons, the profit-making dimension of the triple bottom line approach has tended to overshadow the commitment of most industries to those of the people and the planet, which raises concerns to industry operators to increase their commitments towards the three dimensions of sustainability.

The United Nations introduced the seventeen Sustainable Development Goals (SDGs), which were part of the 2023 Agenda for Sustainable Development indicators, targets, and goals that the global community should achieve to safeguard society and the planet (Chiesi, 2021). The specific component of the SDGs addressing the pharmaceutical industry derives from the global objectives of the Sustainable Development Goals, which include an indirect target that aims to collaborate with pharmaceutical organizations with the aim of offering access to essential affordable drugs in developing nations” (Hassan *et al.*, 2021). The goal for sustainability is proposed to be achieved through collaborations at various levels. At the global level where the players are nations, it is suggested that for nations to attain the SDGs objectives, it will require worldwide collaboration and the participation of the major stakeholders, such as people, advocacy organizations, institutions, and governments. At the firm level, there has been silence on how the collaborations can be initiated and sustained between organizations and other players in society so as to allow for more actors at the macro level of operations of industries and individual firms. We suggest that this gap in articulating how the collaborations can be undertaken among firms and other players in society can be addressed through the lens of social innovation. The pharmaceutical industry is critical to attaining the sustainability goal due to its focus on carrying out innovations, inventions, production and distribution of pharmaceutical products that enhance universal health at the community level. There are indications pointing to increasing pressure on the part of the pharmaceutical industry to ensure accessibility of affordable drugs which calls for more solutions thus opening room for players to embrace more innovative ways in addressing the case for affordable access of drugs (Wafula *et al.*, 2019). While in the developed countries technological advancements have enabled social innovation leading to easy access to drug distribution channels (Buckley & Gostin, 2013), the distributors of pharmaceutical products in the developing countries face more serious challenges resulting from poor regulatory frameworks, lack or poor implementation of existing regulations, poor infrastructure and poverty (Aigbavboa *et al.*, 2020; Gathungu, 2018;

Wairimu & Ndeto, 2019). The concern then is how social innovation would be suitable for adoption by the pharmaceutical industry to enhance ease of access and distribution of their products amidst these challenges.

Over the last few decades, organizational scientists have discussed workplace innovation among themselves. Innovation is generally viewed as an outcome of organizational leadership with key implications for the organization's performance (Lazaretti *et al.*, 2019). Being innovative is not about presenting a novel idea but actualizing it in real life (Zeigler, 2017). Thus, innovation is an integral social process that requires networking, the formation of groups, and interactions among people. The social innovation aspects are critical to the sustainability of any business. In this context, Bhatti and Prabhu (2019) assert that social innovation refers to the utilization of innovative ways to handle social needs from a practical perspective. Social innovation is, therefore a creative means of solving practical problems. Social innovation is critical in the pharmaceutical distribution businesses within informal settlements. The inhabitants of the informal settlements often face diverse challenges, such as social ills, poverty, lack of critical transport infrastructure, and security challenges (Barasa, 2018; Gitatui *et al.*, 2019). These aspects make it challenging for business performance within the context of the informal settlements, thus, necessitating social innovation. The social innovation thus enables the pharmaceuticals operating in those environments to overcome the local business challenges (Wafula *et al.*, 2019).

Though there have been attempts to study innovation in general, less effort has been given to social innovation (Karatepe, Aboramadan, & Dahleez 2020; Khan, Mubarik, & Islam, 2020; Li *et al* 2021). Within the pharmaceutical industry, attempts to study sustainability have not related it to its cause as well as measuring it through the pillars of the TBL model (Beck, 2020; Islam *et al*, 2020; Pourrat *et al.*, 2020; Zarei *et al*, 2020; Reddy & Nande, 2019). Thus, it is critical to determine whether social innovation plays a significant role in sustainability among pharmaceutical distributors in Kenya. The paper therefore sought to answer the questions, how has social innovation been adopted as a business strategy for enhancing access and ease of distribution of pharmaceutical drugs by pharmaceutical distributors? What has been the level of sustainability achieved from the adoption of the social innovation strategy? What is the effect of the level of adoption of social innovation on the level of sustainability achieved? The authors were of the view that answering these concerns would be critical in contributing towards ongoing research on explaining how diverse forms of sustainability have been achieved in a sector whose operations affect the wellbeing of humanity. Secondly, the study relates social innovation with sustainability in a way that fills the void created by previous research in exploring both constructs at multiple levels of analysis. Thirdly, the study focuses on a

developing country context and provides evidence-based information for modeling application of social innovation solutions for need satisfaction to market segments economically characterized as poor or low-income earners.

## LITERATURE REVIEW

### Social Innovation

Social innovation refers to the design and implementation of new solutions that imply conceptual, process, product, or organisational change, which ultimately aim to improve the welfare and wellbeing of individuals and communities. Many initiatives undertaken by the social economy and by the civil society have proven to be innovative in dealing with socio-economic and environmental problems, while contributing to economic development. To fully tap the potential of social innovation, an enabling policy framework is needed to support public, non-profit and private actors to co-construct and implement socially innovative solutions and thereby contribute to address socio-economic issues, build stronger territorial resilience and better respond to future shocks (OECD). Social innovation is the process of developing and deploying effective solutions to challenging and often systemic social and environmental issues in support of social progress. Social innovation is not the prerogative or privilege of any organizational form or legal structure. Solutions often require the active collaboration of constituents across government, business, and the nonprofit world as espoused by Soule, Malhotra, & Clavier (N.D); Malhotra, 2022).

In their study, Bulut *et al.* (2012) defines social innovation as proposed new solutions or ideas to address people's needs that are yet to be met, with the overarching goal of improving their welfare and life standards. For an element to be viewed as socially innovative, it needs to be created, lead to change, and be internalized or accepted. In the extant literature, the common traits evident when it comes to social innovation are that it is regarded as an effective solution, a need, and one that can create beneficial solutions at societal, organisational, and individual levels (Goldenberg, 2004; Neamtan, 2003; Mulgan *et al.*, 2007, Tanimoto & Doi, 2007; Bulut *et al.*, 2012). Moulart *et al.* (2005) and Adams and Hess (2008) propose a five-dimension model of social innovation. The model positions social innovation as an approach for enhancing the capacity of communities that organizations serve. They proposed five ways of addressing this capacity. These ways include satisfying human needs, changing social relations through the process, increasing political and social capability and access to resources, building assets at a community and organisational level, and the entire community acting as a social agent. The study adopted these three indicators of social innovation: enhancing need satisfaction, improving social relations, and individual and community empowerment.

Moulaert *et al.* (2005), Adams and Hess (2008), and Kirwan (2013) note that social innovation (SI) has three critical features. Firstly, SI's goal is to meet the needs of people that have yet to be fulfilled, particularly when it comes to products or services. Secondly, the goal of social innovation is to enhance social relations, and this is linked to making adjustments to social relations' aspects (Moulaert *et al.*, 2005; Adams & Hess, 2008; Kirwan, 2013). For example, individuals who were not included in certain community activities should be engaged increasingly to improve their participation. Finally, social innovation seeks to empower the community. Mainly, that can be achieved by making it easier for individuals to access the needed resources and enhancing their political and social capital. Neumeier (2011) concurs with these components of SI. The researcher noted that social innovation is a new way of civic contribution and democracy that allows marginalized groups to vocalize their needs. What this implies is that social innovation is concerned about including every person and ensuring that each can access justice. A number of studies undertaken have attempted to link innovation in general with organizational outcomes. Few have attempted to look at its role in relation to sustainability (Karatepe & Abramadan, 2020; Khan *et al.*, 2020; Li *et al.* 2021).

The three-cycle model of social innovation has sociological underpinnings and draws its inspiration from the institutional theory. The latter is centered on the macro-level. Based on the institutional theory, the actions and positions of interdependent actors in institutional setups should be assessed while being cognizant that beliefs, norms, and rules are socially negotiated or constituted orders, which means they can be adjusted to enhance social innovations (Carvalho *et al.*, 2017). Although social innovation has become highly influential in both policy and scholarship, a systematic and sustained examination of social innovation, its impacts, characteristics, and theories are lacking (Edwards-Schachter & Wallace, 2017; Judit, Eszter & Gusztáv, 2017; Moulaert *et al.*, 2013; Howaldt *et al.*, 2016). Van Wilk *et al.* (2019) describe social innovation using a three-cycle model, whereby the relational, agentic, multilevel, and situated process is used to promote, develop, and institute new explanations to social issues in ways aimed at causing significant change in an institutional setup (Cajaiba-Santana, 2014).

## **Sustainability**

The first existence of the term sustainability was in the institutional debates of the Rio Summit and institutionalized as an internal strategy for calming social protest and ambiguity (Pérez & Llorente, 2006). After that, the concept gained relevance, especially after 'Our Common future' publication, and has since emerged to elaborate connections between nature and humans as an interdisciplinary science (Mittler, 2007). It placed a condition on sustainability by recognizing the environmental changes that result from the interaction between resource

management and humans in the environment to analyze the threat to the continued existence of life support systems dependent on them (Shahadu, 2016). Thus, because of the report, sustainability as a field of practice and research was developed.

In the last 20 years, there has been a surge in publications on sustainability leading to a distinct branch known as sustainability science being introduced (Komiya & Takeuchi, 2006; Schoolman *et al.*, 2012; Kajikawa *et al.*, 2014). Despite this, sustainability as a concept is still open to different interpretations due to its unique nature of being context-sensitive in its understanding (Purvis *et al.*, 2018). Based on a prevalent description of sustainability, it employs three interconnected dimensions, pillars, stool legs, aspects, perspectives (Boyer *et al.*, 2016; Mori & Christodoulou, 2012), and 'components' (Zijp *et al.*, 2015; Tanguay *et al.*, 2010; Arushanyan *et al.*, 2017), which encompass environmental (or ecological), social, and economic factors.

Currently, local and global attention has been drawn to the discussion on sustainable development, which is increasingly viewed as a multidimensional occurrence with the need to understand its involvement in different aspects of people (Boarini, Kolev, & McGregor, 2014). In most instances in literature, the lack of standardized definitions has influenced the use of sustainable development, sustainable science, and sustainability interchangeably, placing importance on setting apparent differences. The Brundtland Report defines sustainable development as "one that meets the present generation's needs without interfering with the future generations' capacity to satisfy their own goals and interests" (Pérez & Llorente, 2006). Similarly, Shahudu (2016) defines sustainability as: " a problem-inspired, disciplinary science of systematic inquiry into the interconnections and relations between the past, present, and future of life and its support systems, to keep the productive capacity of life support systems in harmony with the demands placed on them, at all times." Recently, researchers have used this to mean the convergence between economic, environmental and social aspects of sustainability, which is evidenced by 68 percent of 250 firms that generated sustainability reports covering these aspects (Shahudu, 2016). The study drew support from the logic found in the postulates of the TBL Model to identify operational indicators of the construct of sustainability. The idea of sustainability is often broken down into three pillars: economic, environmental, and social—also known informally as profits, planet, and people. In that breakdown, the concept of "economic sustainability" focuses on conserving the natural resources that provide physical inputs for economic production, including both renewable and exhaustible inputs.

The concept of "environmental sustainability" adds greater emphasis on the life support systems, such as the atmosphere or soil, that must be maintained for economic production or human life to even occur. In contrast, social sustainability focuses on the human effects of

economic systems, and the category includes attempts to eradicate poverty and hunger, as well as to combat inequality. In 1994, the triple bottom line concept was presented into the business field, as the new taxonomy of sustainability. It embraced new guiding principles for industries to follow and solve the sustainable development goals (SDGs) that were presented in the United Nations Rio+20 summit and the Millennium Development Goals (MDGs) of 2015. The concept was aimed at challenging companies to include people and the planet's security in their strategic business models and to create new taxonomies and instruments to evaluate the prejudices that the environment caused (Griggs *et al.*, 2013). Elkington (1997) presents the 3Ps designation for planet, people, and profits as a threefold goal toward ensuring true sustainability. To be successful in a truthful triple-bottom-line development, Srivastava *et al.* (2021) contend that an organisation should regard having all three parts with positive returns.

According to Swarnakar *et al.* (2022), the triple bottom line (TBL) uses social, financial, and environmental aspects as the viewpoints for its framework. Higher business value has been created by several industries through the implementation of TBL, thus assessing the sustainability of business performance. Integrating environmental and social measures into the TBL framework sets it aside from the traditional framework that is limited as a means of measurement (Swarnakar *et al.*, 2022).

Reddy and Naude (2019) found evidence of high pressure to minimize selling prices, a lack of support from the government, and high costs affected the supply chain. Although the study was critical in identifying factors affecting the adoption of green supply chain initiatives, these aspects were only applicable to the Durban pharmaceutical company. Furthermore, it only covered aspects affecting the adoption of environmental measures and not social or economic aspects. Further, Mackintosh *et al.* (2018)'s study focused on the benefits of producing pharmaceuticals locally in Africa to ensure access to medicines by locals and improved treatment. The researchers noted that health systems specialists on a global scale were skeptical that the manufacturers of these medical products in sub-Saharan Africa (SSA) could result in the reliability of supply, quality medicine, and competitive pricing. They used a qualitative research design where interviews were conducted in 2017 and between 2013 and 2015 in East Africa. They found out that actors involved in the healthcare sector regard investments in the production of pharmaceuticals locally as an excellent avenue to enhance access to supplies and medicines. The study is critical in providing solutions to shortages in pharmaceuticals in developing African nations.

Abbot *et al.* (2021) studied the extent to which gaps in economic stability present hindrances for African nations to produce pharmaceutical products locally. The methodology entailed desk research, preparing an initiation report, using focus groups, interviewing

stakeholders, and questionnaires. The researchers found that gaps in financing make it difficult for African pharmaceutical companies to produce pharmaceuticals locally. Mainly, these issues are linked to investors perceiving investing in Africa as risky, market environmental factors, and weak infrastructure. Although the report comprehensively analysed the financial aspects that make it difficult for African nations to manufacture their pharmaceuticals, it did not provide practical solutions. Other studies also demonstrate social innovation's influence on sustainability aspects to complete a causal mediation relationship. Kiplagat and Odollo (2021) undertook a study that examined the influence of strategic responses on the pharmaceutical firms within Nairobi City County. The influence of technology on the performance of pharmaceutical firms was one of the components examined in the study. The study adopted a descriptive research design and collected data from 119 pharmaceutical firms in Nairobi County. The study found that innovation impacts technology use, employee competences, and data management, which are seen as the drivers of organizational performance. The study also noted that innovation led to the development of new products and services, reduction of delivery times, increase in information accuracy, improvement of product quality, improvement of stock management, and detection of sub-standard products, which further improved the performance of the pharmaceutical sector. In view of the extant empirical literature, it is observable that there have been some attempts to investigate sustainability in general. However, fewer attempts have been made on investigating sustainability within the pharmaceutical industry. Where such attempts have been made, the researchers have not addressed it in terms of its specific dimensions that draw from the TBL model. Thus, more work is required in this sector to explain its behaviour using the pillars drawn from the TBL model.

## **METHODOLOGY**

### **Research Design**

A descriptive cross sectional research design was used in this study as the goal was to collect results from different groups in the pharmaceutical industry in Kenya to answer the role they play in innovation. Based on the nature of this study, a cross-sectional study design was paired with descriptive research. Aggarwal and Ranganathan (2019) note that descriptive research describes how one or more variables are distributed without regard to other or causal hypotheses.

### **Population and Sampling**

The population of the study comprised all pharmaceutical distributors serving informal settlements in Nairobi City. According to the Nairobi City County Government Development

Plan, the city has several informal settlements including Kibera, Mathare, Huruma, Kariobangi North, Mukuru, Kayole, and Dandora. The number of pharmaceutical distributors supplying these informal areas is approximated to be 30. Thus, the total population comprised 30 pharmaceutical distributors who constituted the unit of analysis. The target unit of observation in each of the pharmaceutical distributors was the recognized formal leadership position responsible for decision making and administration in the functional areas of finance, sales and marketing, logistics, HR and administration, medical representation, pharmacy, and top management. The officers serving in the departments that comprised the unit of observation at the time of the survey were identified as the respondents from whom data was obtained. The respondents therefore included CEOs, HR and Administration managers, finance managers, sales and marketing managers, logistics and supply chain managers, pharmaceutical technologist and medical representatives within the pharmaceutical distributors. The possible total number of the unit of observation was 210. The study was done as a census of all the pharmaceutical distributors supplying informal settlement areas in Nairobi. However, at the unit of observation, the study purposively sampled administrative levels that were considered to offer the office holders an opportunity to practice aspects of social innovation in the ordinary course of performance of their duties. This study collected primary data that is quantitative.

### **Research Data**

The primary data required for the study was obtained from respondents working in different departments, levels of management in the pharmaceutical distributors. A structured questionnaire on a five - point scale was designed using operational indicators reviewed. In addition to the data on the study constructs, the study also obtained data on the biographic attributes of the respondents as well as the business characteristics of the pharmaceutical distributors. Several methods were applied to obtain the data. Telephone calls were first made or emails written to the CEOs of the pharmaceutical distributors to seek for permission, after which the researchers' distributed questioners to the target respondents in each pharmaceutical distributor. The respondents were introduced to the instrument and then given time to respond to the questionnaires to be collected later.

Structural Equation Modelling (SEM) was adopted for the data analysis. The researchers performed the SEM Analysis with the aid of the IBM SPSS Amos Version 21 software which had the features capable of performing data analysis using both the ordinary regression and structural equation model path analysis. The version of the software required the data be input first into SPSS Spreadsheet then exported into the Amos feature of the software to enable the researchers perform the Confirmatory Factor Analysis, Model Fit and Path Analysis model

structure. The goal was to use the independent variables as predictors of the sustainability of pharmaceutical distributors in Nairobi County's informal settlement areas. The SEM approach enabled the researchers to first do an exploratory factor analysis so as to understand the conceptual structure of each of the study constructs as well cluster components of the study constructs based on factor loadings. The extracted components and retained factors were then used to construct the path analysis showing the causal effects in a way that would help the researchers explain the contribution of the extracted components from both the independent and dependent constructs. The study sought to examine the effect of social innovation on sustainability of pharmaceutical distributors. The reliability of the instrument was tested using Cronbach alpha score prior to and after the EFA. The results of the reliability analysis are summarized in table 1.

Table 1: Instrument Reliability Before and after EFA

Construct	No. of Components	N	$\alpha$ before EFA	$\alpha$ after EFA
Social Innovation	2	136	0.971	0.928
Sustainability	3	131	0.924	0.798

The extracted components and retained factors for each construct were used to compute measures of central tendency and dispersion so as to provide information required for answering objectives one and two of the study.

## FINDINGS

### Respondents' Characteristics

#### *Leadership/ Management Position of the Respondent*

The first demographic attribute that the research required respondents to respond to was on the leadership position they were serving at the time of the survey. Table 2 and figure present a summary of the frequencies.

Table 2: Distribution of the Management Position

	Frequency	Percent	Valid Percent	Cumulative Percent
CEO	24	14.3	14.3	14.3
Corporate	24	14.3	14.3	28.6
Pharmacist	24	14.3	14.3	42.9
Logistic	24	14.3	14.3	57.1
Sales & Marketing	24	14.3	14.3	71.4
Finance	24	14.3	14.3	85.7
HR & Admin	24	14.3	14.3	100.0
<b>Total</b>	<b>168</b>	<b>100.0</b>	<b>100.0</b>	

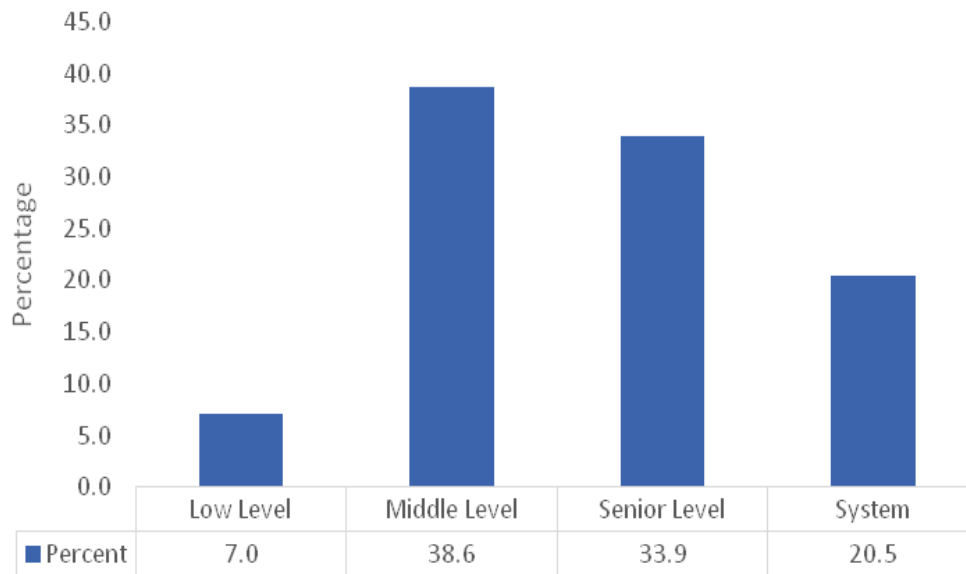


Figure 1: Respondents' Management Level in the Organization

Including representatives from various job positions illustrates the researchers' commitment to comprehensive research. According to Jones *et al.* (2022), equitable dissemination of demographic details throughout job positions improves the researcher's ability to generalize discoveries. Therefore, the presented data reflects the study's rigorous approach to demographic representation and highlights the significance of considering multiple job positions in examining the relationship between servant leadership and sustainability within the pharmaceutical sector. The findings report that each level had 24 participants, which comprised around 14.3% of the overall pool of participants. This well-balanced distribution ensures that the study provides insights into diverse essential roles within pharmaceutical distribution companies including participants with varying leadership roles enables researchers to understand how the collaboration between servant leadership and market entry hurdles influences the sustainability of pharmaceutical distributors (Sjöström *et al.*, 2023).

Different job functions can bring varying viewpoints and real-world experiences to better understand industry dynamics (Andrus & Villeneuve, 2022). By including individuals from various job functions, the research can fully explore the unique difficulties encountered by each group in pharmaceutical distribution

### **Gender of Respondents**

Data on the gender breakdown among participants was obtained. The results on the distribution of the respondents according to their gender is summarized in Table 3 and figure 2.

Table 3: Gender Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	65	38.7	60.2	60.2
	Female	43	25.6	39.8	100.0
	Total	108	64.3	100.0	
Missing	System	60	35.7		
<b>Total</b>		<b>168</b>	<b>100.0</b>		

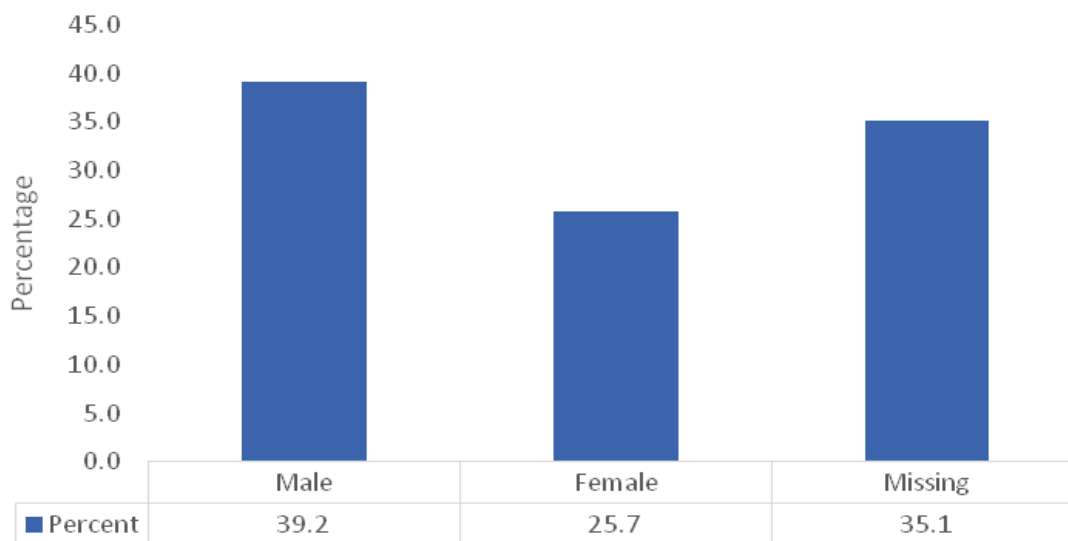


Figure 2: Respondents' Gender

The demographic analysis highlights a distinct disparity between male and female participants. Further, 60 individuals (35.7%) failed to provide their gender details, creating missing data issues. Even with gender disparities, the study collected numerous valuable responses from both genders. According to Moreira et al. (2023), researchers that endeavour to gather information on gender demonstrate their dedication to grasping potential gender-related distinctions. In this case, a more complete analysis of the research topic will be achieved by considering the perspectives of both genders. Also, gender representation enabled the study of gender-related patterns, experiences, and challenges in the pharmaceutical industry (Lee et al., 2020).

### ***Educational Level of Respondents***

The study sought to investigate the participants' highest level of education. The result on the characteristic of the respondent level of education were presented in distribution frequency and percentages as shown in Table 4.

Table 4: Distribution of Respondent Level of Education

Level of Education		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Secondary Level	4	2.4	3.0	3.0
	Certificate Level	19	11.3	14.2	17.2
	Graduate Level	70	41.7	52.2	69.4
	Post Graduate Level	41	24.4	30.6	100.0
	<b>Total</b>	<b>134</b>	<b>79.8</b>	<b>100.0</b>	
Missing	System	34	20.2		
<b>Total</b>		<b>168</b>	<b>100.0</b>		

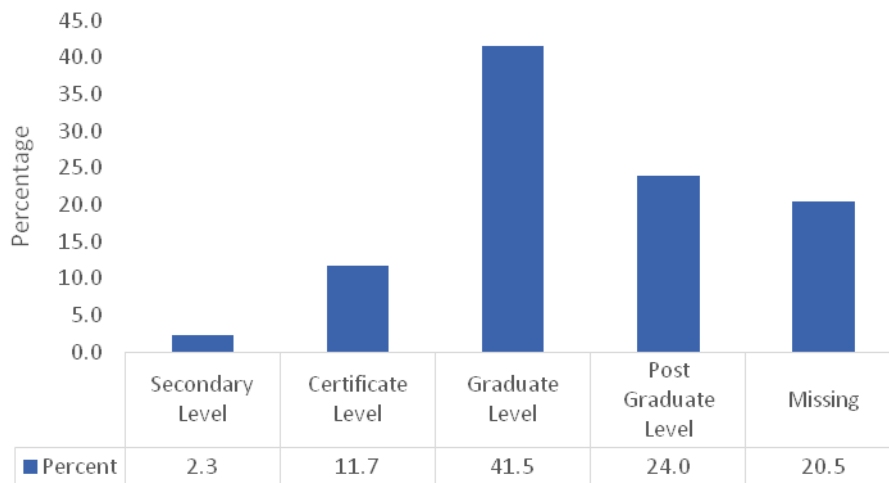


Figure 3: Respondents' Education Level

Out of the 168 participants surveyed, only 134 (79.8%) provided information on their educational level. 52.2% of valid responses indicate that participants have achieved a Graduate Level qualification. A considerable number of participants had undergraduate qualifications. Participants that had advanced their studies to the postgraduate level represented 30.6% of the total respondents. 14.2% of the respondents had a certificate-level certification, while only 3% had high school certification. The findings indicate a significant number of participants had advanced qualifications.

### Level of Social Innovation Adopted

Objective 1 of the study required the researchers to establish the level of social innovation adopted by the pharmaceutical distributors sampled. The instrument used to collect the primary data presented items that required the respondents to respond in a scale of 1-5. Exploratory Factor analysis was applied to cluster the items in the questionnaire comprising social innovation into the respective clusters with their corresponding indicators based on factor

loadings. The EFA extracted two components of social innovation that the researchers labelled Promoting Social Values and Community Empowerment. Measures of central tendency and dispersion were then computed for each of the components and their indicators and the results summarized in table 5.

Table 5: Results of Measures of Central Tendency and Dispersion

Component	Indicators	Factor Loading	Mean	Std Dev
<b>Component 1: Promoting Social Values</b>	Programs to promote social values	.654	3.72	1.238
	Target to change the community's social norms that hinder its development	.724	3.52	1.433
	Reduce street children behaviour	.770	3.43	1.541
	Promote girl child education	.782	3.51	1.51
	Promote youth sports programs	.758	3.42	1.549
	Promote Social change	.751	3.75	1.406
	Increase the community's innovative capacity.	.601	3.83	1.245
	Enhance Social participation.	.856	3.79	1.238
	Promote social values	.835	3.62	1.318
<b>Component 2: Community Empowerment</b>	Changing social norms holding the community backward	.760	3.48	1.381
	Sensitize the community in the informal settlement areas to be more aware of their needs at individual and community level.	.816	3.38	1.285
	Provide solutions for bringing about social change to the community.	.644	3.49	1.362
	Deploy new techniques to increase the innovative capacity of the employees.	.887	3.79	1.174
	Come up with ideas to increase social participation in society	.788	3.72	1.317
	Programs to promote environmental conservation	.666	3.51	1.341
	Programs to promote safe drug consumption behaviours	.713	3.66	1.372

The results in table 5 show that the two components of social innovation were adopted by the pharmaceutical distributors to a level that tends towards high extent. There is however a relatively wide variation in the manner that the distributors adopted as observed from the standard deviation that ranges from 1.1 to 1.5.

### Level of Sustainability Achieved

The dependent variable of sustainability was measured using three indicators of Planet, People and Profits. The data collection instrument presented 18 items to the respondents to

indicate the extent the pharmaceutical distributors had attained. The descriptive results on each of three components of sustainability are presented in Table 6.

Table 6: Descriptive Statistics on Sustainability

<b>PLANET</b>	<b>N</b>	<b>Mean</b>	<b>Std. Dev.</b>
Reducing solid waste	138	3.81	.909
Reducing water waste	139	3.83	.937
Reducing occupational workplace accidents	139	4.12	.910
Reducing consumption of hazardous toxic substances	138	3.95	.954
Improvement in compliance with Environmental management standards	138	3.92	1.019
Reduction in health and safety incidences	139	4.14	.929
<b>Sub Variable Aggregate</b>		<b>3.926</b>	<b>0.958</b>
<b>PEOPLE</b>			
Improvement in branding image of the company as a good place to work in	136	4.03	.966
Earning a corporate reputation for being an ethical organization	137	4.14	.933
Improving employee health and safety	139	4.17	.952
Improving the wellbeing of the community	138	3.94	1.009
Reducing the costs of distributing drugs	139	3.86	1.058
<b>Sub Variable Aggregate Scores</b>		<b>4.028</b>	<b>0.977</b>
<b>PROFIT</b>			
Increase in sales of products	135	3.42	1.123
Increase in organisational profits	134	3.46	1.087
Increase in market share	135	3.44	1.131
Penetration to new markets	135	3.47	1.177
Improvement in productivity	135	3.57	1.182
<b>Sub Variable Aggregate</b>		<b>3.472</b>	<b>1.14</b>
<b>Variable Aggregate</b>		<b>3.808</b>	<b>1.025</b>

The descriptive results indicate that the three components of sustainability were attained to a level of high extent. The people component had the highest level of achievement which was then followed by planet. The measure of dispersion on each of the components shows that the respondents did not vary widely in their opinions on how the sampled pharmaceutical distributors had achieved their goal of sustainability.

### Effect of Social Innovation on Sustainability

To answer the third objective of the study, structural equation model was used to analyze the path analysis showing the causal effect of the extracted components of social innovation on sustainability. The SEM process for regression analysis produced three types of outputs that helped in answering the concerns of the objective namely the model fit table, regression coefficients and the path analysis diagram. The set of outputs produced by the SPSS

Amos software were drawn after the software undertook the necessary iterations that offer the most optimal output for the interpretation of the data. The outputs presented in the paper were after the software made 14 iterations. The SEM outputs are presented in tables 6-7 and figure 5.

Table 7: Model Fit Statistics

$\chi^2$	CFI	RMSEA	NCP	FMIN	PCFI	PNFI	NFI
3.011	1.000	0.000	0.000	.018	.267	.265	.993
DF – 4							
P= .556							

Table 8 Regression Coefficients

Unstandardized Coefficients							
			Estimate	S.E.	C.R.	P	Label
Sustainability	<---	SI	-.134	.048	-2.816	.005	par_4
SSIC2	<---	SI	1.000				
SSIC1	<---	SI	1.231	.233	5.286	***	par_1
Profit	<---	Sustainability	1.000				
Planet	<---	Sustainability	1.478	.277	5.326	***	par_2
People	<---	Sustainability	1.534	.286	5.365	***	par_3

Standardized Coefficients							
				Estimate			
Sustainability	<---	SI		-.280			
SSIC2	<---	SI		.859			
SSIC1	<---	SI		1.005			
Profit	<---	Sustainability		.454			
Planet	<---	Sustainability		.929			
People	<---	Sustainability		.915			

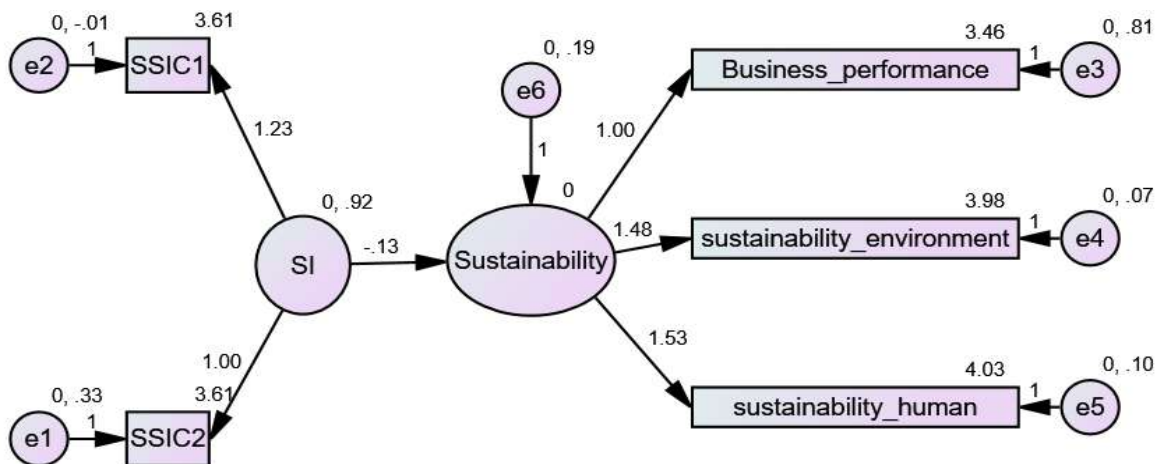


Figure 5: SEM Path Analysis Structure

The parameter values for Chi-square likelihood, CFI, RMSEA, NCP, FMIN, PCFI and PNFI meet the requirement for a model goodness of fit. The regression model is suitable for the intended analysis purpose. The coefficients table indicates that sustainability is affected negatively by social innovation ( $\beta = -0.13$ ;  $p = 0.05$ ); The two components of social innovation are significant ( $\beta = 1.005$ ;  $p < 0.000$ ;  $\beta = 0.859$ ;  $p < 0.000$ ). The people component of sustainability has the highest level of effect obtained from social innovation followed by planet with the least being profit ( $R^2 = 0.03$ ; 0.98 and 0.40 respectively). The study therefore concludes that social innovation Strategy has a significant statistical effect on sustainability in the pharmaceutical industry.

## DISCUSSIONS AND IMPLICATIONS FOR THEORY AND PRACTICE

The first objective of the study focused the extent to which social innovation strategy has been adopted by the pharmaceutical distributors. The EFA extracted two components of social innovation strategy namely promoting social values and community empowerment. The conceptual reasoning behind the investigation based on social innovation was that it would be resorted to in enabling the pharmaceutical distributors address the challenges faced with regard to accessing the market dissegments in the informal settlements. The manner in which social innovation would be embraced is through building networks. The two components extracted of promoting social values and community empowerment are such that realizing the goals of each necessitates the pharmaceutical distributors to engage with other actors in the communities where these markets are based in addressing challenges faced. The level of adoption of these two components of social innovation was at a point of high extent. The components extracted and found to be practiced among the pharmaceutical distributors are consistent with those found in the model by Moolaert *et al.* (2005) and Adams and Hess (2008).

Objective two of the study sought to determine the level of sustainability achieved from the extent of social innovation strategy adopted by the pharmaceutical distributors. Sustainability was measured using the three pillars of the TBL model of people, planet and profit. Overall, the level of sustainability attained was at a high extent. The people component obtained the highest contribution followed by planet and the least is profit. Given the two components of social innovation where the pharmaceutical distributors have given attention to, it would be logical to expect that the people component would attract the highest contribution as attending to promotion of social values and community empowerment would require a reasonable amount of investment of resources of time and other economic resources on the members of the community so as to achieve the needed level of transformation at the community level. Due to the challenges faced by the market segments, investments are also

committed to addressing areas of physical infrastructure, security and other aspects of the physical environment thus justifying the dimension of planet being ranked relatively high.

The last objective focused on assessing the effect of social innovation on sustainability of the sampled pharmaceutical distributors. The SEM output on the regression coefficients and the path analysis diagram show a negative effect of social innovation on sustainability. Though the levels of adoption of social innovation and that of sustainability are to a high extent, the concern then arises as to why the causal effect is negative. The authors explain this in terms of the type of data used in the study as well as the practical nature of the constructs of social innovation and sustainability. In terms of the data collected, that on the independent construct was measured in terms of the opinions/ perceptions of the respondents while that on sustainability measured in actual terms using an objective indicator. The perceptions of the sampled respondents will reflect their intentions and wishes which may not necessarily be translated into tangible actions when decisions are made. To that extent the decisions made at organizational level may not necessarily affect their wishes as captured by their attitudes. On the other hand, sustainability is a matter of fact depicting whether tangible change has been experienced in people, the environment and the organizations level of profits. Thus, the study reports an inverse effect of social innovation on sustainability. Previous researches undertaken on both social innovation and sustainability indicated that the findings reported in this study are consistent. Previous researches done in Iran, France, US, Bangladesh and Africa that used sustainability as a criterion variable in the pharmaceutical industry reported an inverse relationship (Zarei *et al.*, 2020; Pourrat *et al.*, 2020; Islam *et al.*, 2019; Beck *et al.*, 2020; Waleng & Namngongo, 2022). Those that focused on relating social innovation to sustainability also reported similar results (Yong-Ha & Young-Tack, 2020; Steele *et al.*, 2020). Given this scenario, then in practice it would be of interest to try and understand the circumstances under which the various factors investigated in relation to sustainability would yield positive outcomes.

## CONCLUSION AND DIRECTION FOR FUTURE RESEARCH

The focus of the study was three-fold. One determining the level of adoption of social innovation, the level of sustainability attained and the effect of level of adoption of social innovation on the level of sustainability attained. The findings reported indicate that social innovation has been adopted to a high extent and that two components of social innovation, mainly promoting social values and community empowerment are relevant for adoption in the industry. In addition, the level of sustainability attained is relatively higher than that of the level of social innovation. However, the inferential analysis, indicate that there is an inverse effect of social innovation on sustainability. The study makes several conclusions. First, social innovation

is elevated for adoption among the pharmaceutical distributors targeting the informal settlements in Nairobi County. Secondly, social innovation has a statistically significant, negative effect on the level of sustainability attained. The findings of the study are limited by a number of factors. First, the type of data used in measuring the independent construct of the study was based on self reported perceptions which could be biased to some extent. Secondly, the operationalisation of the dependent variable, was based on the literature drawn from the TBL model much of which has not been empirically tested. The authors therefore suggest that these limitations could be addressed in future research by collecting more objective data, on social innovation and by integrating other aspects of sustainability, into those that are drawn from the TBL model.

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