

**INVESTING IN SOCIAL INNOVATION FOR SUSTAINABILITY: IDENTIFYING
THE CAUSAL EFFECTS IN PHARMACEUTICAL DISTRIBUTORS TARGETING
INFORMAL SETTLEMENT AREAS IN NAIROBI CITY, KENYA**

BY

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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. 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 how social innovation has been adopted, the level of sustainability attained as well as the effect of the level of social innovation 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 pharmaceuticals representing 80.4% response rate. Two components of social innovation, namely promoting social values and community empowerment were extracted through Exploratory Factor Analysis and 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 people ($R^2=4.03$) and the least on profit ($R^2=3.46$). 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 makes suggestions on how it can be deployed to enhance sustainability in the pharmaceutical industry. The findings raise important implications on the relevance of the Three Cycle and Triple Bottom Line Models in explaining the role of social innovation in attaining the goal of sustainability in organizations.

Key words: *Social Innovation; 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 *et al.* (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.* (2022) 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) define 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, *et al.*, 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 2030 Agenda for Sustainable Development indicators, targets, and goals that the global community should achieve to safeguard society and the planet (Chiesi, Sustainability Report, 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 (Lazaretti *et al.*, 2019; Zeigler, 2017). While in the developed countries technological advancements have enabled social innovation leading to easy access to drug distribution channels (Buckley *et al.*, 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. 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 where the inhabitants often face diverse challenges, such as social ills, poverty, lack of critical transport infrastructure, and security challenges (Barasa, 2018; Gitatui *et al.*, 2019). These conditions 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 & Abira modan 2020, Khan, 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 attaining sustainability among pharmaceutical distributors in Kenya. The paper therefore sought to answer three questions: (1) how has social innovation been adopted as a business strategy for enhancing access and ease of distribution of pharmaceutical drugs by pharmaceutical distributors? (2) What has been the level of

sustainability achieved from the level of adoption of the social innovation strategy? (3) what is the effect of the level of adoption of social innovation on the level of sustainability achieved by the pharmaceutical distributors? The authors were of the view that answering these three 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 supplies evidence based information for modeling application of social innovation solutions for need satisfaction in market segments economically segmented as poor or low income earners.

LITERATURE REVIEW

This section of the paper presents the reviewed theoretical, conceptual and empirical literatures that the researchers relied on in addressing the objectives of the study. The section first presents the discussion on the two theories anchoring the study which is then followed by the conceptual and empirical review of relevant literature on the two study constructs that build the conceptualization guiding the study.

Theoretical and Conceptual Background

The phenomenon investigated involved two study constructs, social innovation and sustainability. Two theories were identified in the literature as suitable for anchoring the conceptualization, namely the Three Cycle Model and the Triple Boom Line (TBL) Model. The Three Cycle Model is attributed to Edwards-Schachter and Wallace (2017), Judit *et al.*(2016) Pue *et al.*(2015) and Van Wijk (2019) who offered the model as a sociological approach to explaining social innovation. Its background lies in the institutional theory which brings a macro level focus into understanding social innovation behaviour. The focus of the model is how to solve social issues by bringing about social change in the institutional set up that sustains identified social problems. The components the model suggests for addressing the social issues comprise relational, agentic, multilevel and situated processes that are suitable for promoting development. For the change to take place, the proponents suggest that the relevant actors need to be brought on board to address the institutional circumstances by embedding social innovations to form a social innovation framework which is premised on creative social strategy, the driving forces of structural agentic engines and social change through social inclusion by reconfiguring social relations thus raising the capacity of societies to satisfy their needs. The arguments of the Three Cycle were thus adopted in the study to anchor the Independent variable of Social Innovation.

The TBL Model draws from the work of Elkington (1997) who presented the model as a new taxonomy of sustainability. The model focused on suggesting principles for industries to follow in solving sustainability goals. The model stands on the pillars of the 3Ps of sustainability of Planet, People and Profit. The model considered that if organizations align operations with those 3Ps, they would have initiated a reliable path for assuring true sustainability. The Planet pillar focuses on managing environmental issues to achieve positive impacts on the natural

environment while the people pillar focuses on the social concerns of the community thus injecting a social viewpoint in the management of organizations. The key concerns are commitment to people through human capital and social exchange and community welfare. The profit pillar addresses the organizations economic success through financial performance with the main goal being that of raising positive returns through creation of economic value. The TBL Model was therefore used in the study to support the dependent variable.

Empirical Review and Conceptualization

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, 2005). Social innovation entails the process of developing and deploying effective solutions to challenging and often systemic social and environmental issues in support of social progress and as such is not the prerogative or privilege of any organizational form or legal structure since delivery of solutions often requires the active collaboration of constituents across government, business, and the nonprofit world (Soule, 2020).

Bulut (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 should have the capacity to provide an effective solution to a need and create beneficial solutions at societal, organisational, and individual levels (Goldenberg, 2004; Neamtan, 2003; Mulgan *et al.*, 2007; Tanimoto & Doi, 2007; Bulut, 2012). Moulaert *et al.* (2005) and Adams and Hess (2008) propose a five-dimension model of social innovation which positions social innovation as an approach for enhancing the capacity of communities that organizations serve to achieve need satisfaction. 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.

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. Van Wijk *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). 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).

Finally, social innovation seeks to empower the community which can be achieved by making it easier for individuals to access the needed resources and enhancing their political and social capital. Neumeier (2012) concurs with these components of SI. The researcher notes 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. The researchers relied on these models to adopt three indicators of social innovation, namely enhancing need satisfaction, improving social relations, and individual and community empowerment. The authors considered that the characteristics of these indicators would contribute towards addressing some of the identified conceptual, theoretical and empirical gaps in extant literature. It has been pointed that 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 (Monica Edwards-Schachter & Wallace, 2017; Judit, Eszter & Gusztáv, 2016; Moulaert *et al.*, 2013; Howaldt & Schwar, 2016). Further, on considering a section of the empirical literature, it is observed that though a number of the studies undertaken have attempted to link innovation in general with organizational outcomes, few have attempted to consider its role in relation to sustainability (Karatepe & Abramadan, 2020; Khan 2020; Li et al 2021).

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, 1999). 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 that are 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 (Komiyama & 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.” Some evidence indicates that 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). This 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 the effect of high costs on the supply chain in the pharmaceutical industry. 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 was considered 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.

RESEARCH METHODOLOGY

Research Design

A descriptive cross sectional research design was used in this study as the goal was to collect data 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. There is an estimated number of pharmaceutical distributors supplying these informal areas approximated at 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.

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 likert scale was designed using operational indicators obtained from reviewed literature. 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 CEO's of the pharmaceutical distributors to seek for permission, after which the researchers distributed questionnaires 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 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 as 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 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	αBefore EFA	αScore 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

Several characteristics of the respondents and those of the pharmaceutical distributors were considered suitable for helping understand both the unit of analysis and observation. Those that the instrument presented to the respondents are presented in this section covering the leadership position, respondent gender and their education level.

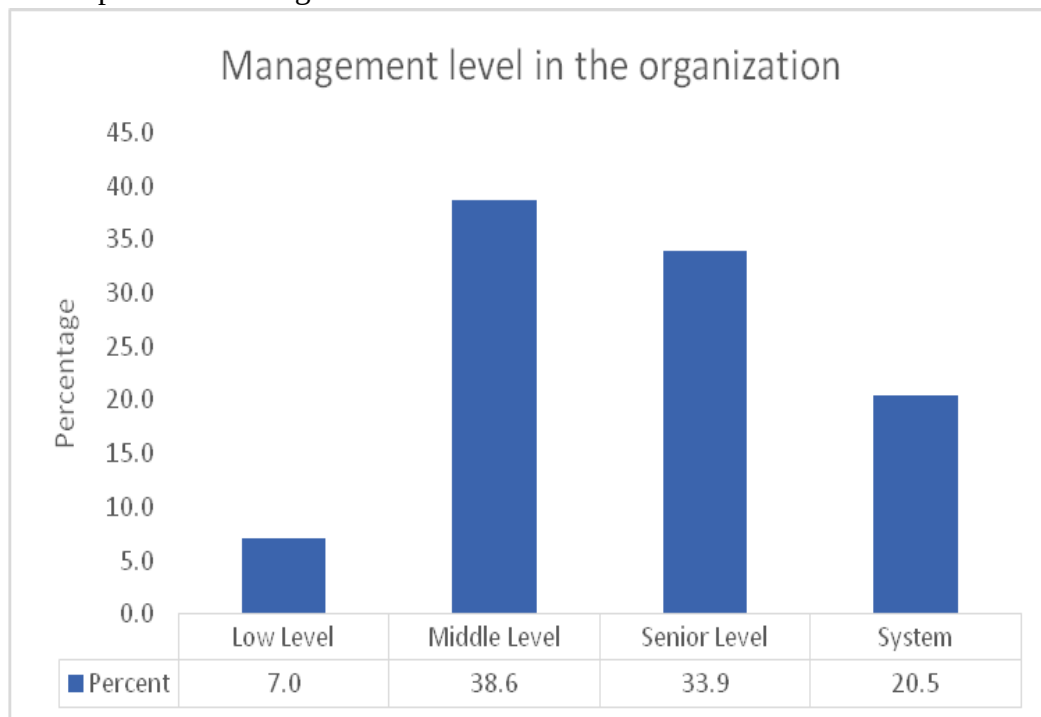
Leadership/ Management Position of the Respondent

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 1 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 & Administrartion	24	14.3	14.3	100.0
Total	168	100.0	100.0	

Figure1. Respondents Management Level



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).

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		
Total		168	100.0		

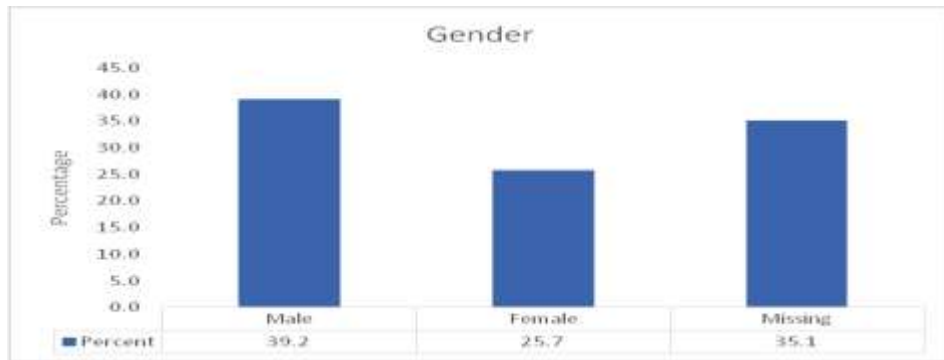


Figure 2 Respondents' Gender

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.

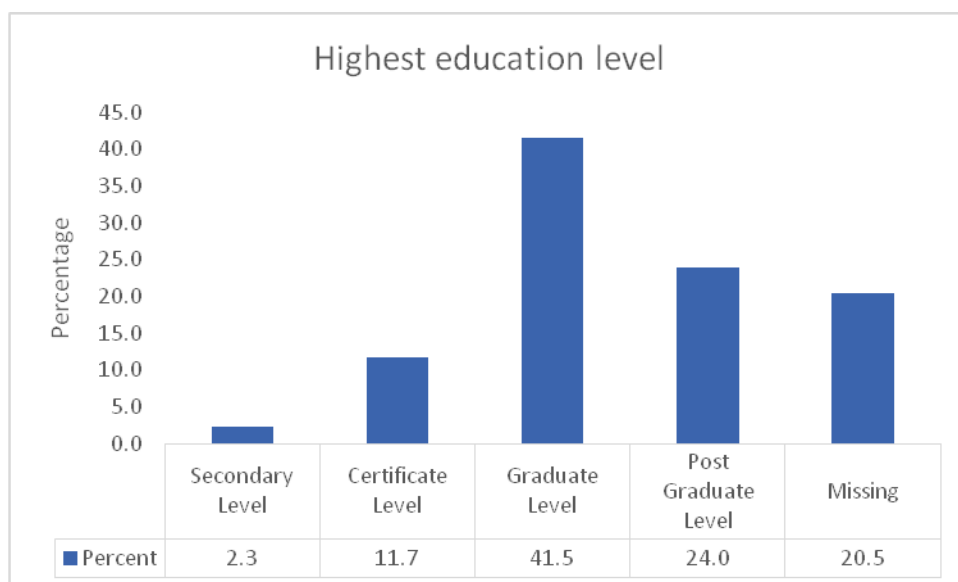
Educational Level of Respondents

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 Respondents

Level of Education		Frequency	Percent
Valid	Secondary Level	4	2.4
	Certificate Level	19	11.3
	Graduate Level	70	41.7
	Post Graduate Level	41	24.4
	Total	134	79.8
Missing	System	34	20.2
Total		168	100.0

Figure 3: Respondent 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 qualification, while only 3% had high school certificate. 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: Descriptive Analysis of Social Innovation Components

Component	Indicators	Factor Loading	Mean	Std Dev
Component 1: Promoting Social Values	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
	Changing social norms holding the community backward	.760	3.48	1.381
Component 2: Community Empowerment	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 4 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 social innovation 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 each of them. The descriptive results on each of the three components of sustainability are presented in Table 6

Table 6: Descriptive Statistics on Sustainability

Planet	N	Mean	Std. Dev.
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
Sub Variable Aggregate		3.926	0.958
People			
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	137	4.14	.933

organization			
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
Sub Variable Aggregate Scores		4.028	0.977
Profit			
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
Sub Variable Aggregate		3.472	1.14
Variable Aggregate		3.808	1.025

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 construct 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 SEM outputs are presented in tables 7-8 and figure 7.

Table 7: Model Fit Statistics

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

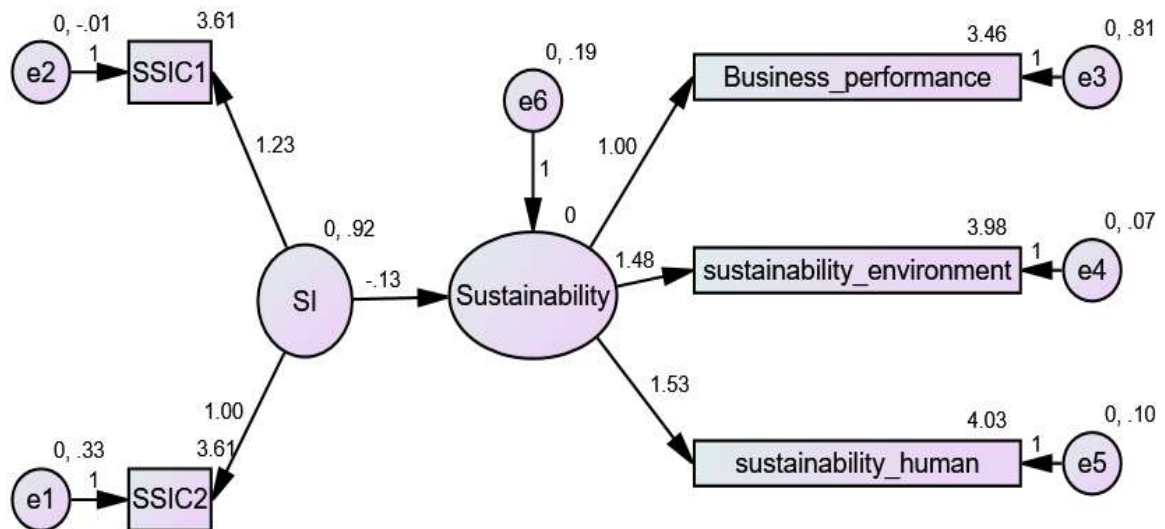
Table 8: Regression Coefficients

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

Unstandardized Coefficients					
		Estimate	S.E.	C.R.	P
People	<--- Sustainability	1.534	.286	5.365	***
					par_3

Standardized Cefficients				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



SSIC 1= Promoting Social Values SSIC2=Community Empowerment SI=Social Innovation

The parameter values for Chi- square likely hood, 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 ($\beta = 1.231$; $p < 0.000$; $\beta = 1.00$; $p < 0.000$). The people component of sustainability has the highest level of effect obtained from social innovation followed by planet with the least being profit ($R^2 = 4.03$; 3.98 and 3.40 respectively). Thus the study concludes that Social Innovation has a significant statistical negative effect on sustainability in the pharmaceutical industry.

DISCUSSIONS AND IMPLICATIONS FOR THEORY AND PRACTICE

The first objective of the study focused on determining the extent to which social innovation has been adopted by the pharmaceutical distributors. The EFA extracted two components of social innovation 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 segments 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 Moulart *et al.* (2005) and Adams and Hess (2008). The three cycle model which the researchers relied on to anchor the operationalisation of the construct mostly focuses on macro level actions by organizations that seek to identify needs that require satisfaction, initiate collaborative networking then roll out programs at community level that serve as interventions in raising the capacity of target communities to satisfy their needs. The two components extracted of promoting social values and community empowerment consist of several items that ensure needs of the members of the informal settlement areas are addressed through the various programs the pharmaceutical distributors have supported. Thus the findings of the study on objective 1 of the study align with the postulates of the Three Cycle Model and contribute towards addressing conceptual and theoretical gaps identified by.. (Judit, Eszter & Gusztáv, 2016; Moulart *et al.*, 2013; Howaldt & Schwar, 2016).

Objective two of the study sought to determine the level of sustainability achieved from the extent of social innovation 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 has attained 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 TBL model calls on organizations to place a balance on the three pillars of sustainability of social, environment and economy. Even though there are varying levels at which these pillars of sustainability have been achieved by the pharmaceutical distributors, the descriptive statistical scores provide evidence that the three pillars of sustainability have to a high extent been realized through social innovation efforts by the pharmaceutical distributors.

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 at a level of high extent, the concern then arises as to why the causal effect is negative. The two theories that underpinned the study of the three cycle model and the TBL had proposed that the causal effect would be direct, in which case the findings reported are not in agreement with. However, a review of some previous researches indicate that the current findings are consistent with previous researches that have found an inverse relationship. Previous researches undertaken on both social innovation and sustainability indicated that the findings reported in this study are consistent. 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; Pourral *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). Inspite of this consistency with previous research findings, the authors note that the fact that investments in social innovation could lead to negative organizational outcomes would raise concern to management due to the strategic role that innovation plays in the life of an organization. A possible explanation as to how this may be explained could lie in the type of data that the researchers used.

While the data on the independent construct was more perceptual in nature, that on the dependent construct was more on objective data. On this basis, while the perceptions reflect the respondents' mental states, at the relevant decision and action levels where programs are designed and executed to realize target sustainability aspects, there may be a mismatch by the teams assigned by the organizations to carry out the relevant programs that should realize target sustainability pillars. On the other hand, proponents of the sustainability construct have identified measurement related issues as one of the aspects that can affect measurement in empirical work due to lack of uniformity in the manner the construct of sustainability has been understood by managers in practice (Goggings & Henrke, 2016; Sridhor &Jones,2012). Even though the data collection instrument that the study used operationalised the construct of sustainability from postulates of TBL, however during the administration of the instrument in collecting the data, the research did not seek to obtain the respondents' understanding of the construct of sustainability. In addition to this explanation, the authors also note of the possible explanation based on business dynamics. It was observed that the sustainability levels were at a high extent due to the social innovation. If the social innovation is construed to comprise the pharmaceutical distributors' investments in the informal areas, it would be logical to expect that some of the dimensions of the investment could have far reaching economic effects on the bottom line dimensions of the sampled organizations. Logically investments would take time to allow business operations to run in the short run whereby negative returns are reported before they turn positive in the medium and long term periods. Given that the study did not control for the aspect of timing of the investments the distributors have made through social innovation, it would be more practical when attempting to relate investments in social innovation to sustainability to establish the timing of the execution of the decision on social innovation. That would offer an opportunity for both scholars and managers to better explain the conditions under which investments in social innovation would offer positive outcomes to organizations.

CONCLUSION AND DIRECTION FOR FUTURE RESEARCH

The focus of the study was three-fold identifying how social innovation has been adopted by pharmaceutical distributors, determining the level of sustainability attained. The findings

reported indicate that two components of social innovation of promoting social values and community empowerment have been adopted by the pharmaceutical distributors to a level of high extent. This level of adoption of social innovation has contributed to a corresponding high extent of sustainability achieved by the pharmaceutical distributors. Three forms of sustainability have been achieved to varying levels namely, people, planet and profit. The sustainability pillar has attained the highest level while profit has attained the lowest level. The level of social innovation adopted has a statistically negative effect on the level of sustainability attained. The study therefore makes two conclusions. The first is that social innovation is relevant for adoption as a business strategy by pharmaceutical distributors with which to target and support consumers within the geographical segments of the informal settlement areas in urban settings. Managers of the pharmaceutical industry need to consider enhancing their investments towards their social innovation through related programs such as Corporate social responsibility so as to leverage on its potential. Second, even though the level of adoption of social innovation contributes to sustainability, the effect may be inverse based on the timing and circumstances of its measurement. Both scholars and practitioners in the industry need to interrogate the operation of social innovation strategy so as to identify the circumstances in which it would yield positive effects on sustainability.

The findings leading to the above conclusions face several limitations. First, the researchers cite conceptual issues emanating from the limited scope of conceptualization of sustainability and the lack of prior validated instruments on its measurement. The current study relied on operationalisation drawn from the current understanding underpinned in the TBL Model which has not integrated other perspectives. Secondly, the study cites methodological limitations arising from the conceptual nature of the study constructs. The constructs studied have attributes that would require measurement over time through longitudinal designs so as to capture the time series behaviour and trend of the investments and sustainability. The current study was a cross sectional one and was unable to fully explain the set of circumstances under which social innovation as an investment would yield positive organizational outcomes. The authors suggest that future research could expand the scope of the conceptualization of the construct of sustainability by integrating more sustainability models over and above those of the TBL to enrich the scope of conceptualization and measurement. In addition, research designs for studies attempting to link social innovation to sustainability need to employ longitudinal designs and obtain time series objective data

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Informed Consent Statement: The authors confirm that Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to restrictions.

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REFERENCES

- Abbott, F. M., Abbott, R. B., Fortunak, J., Gehl, S. Padmashree, & Walwyn, D. (March 18, 2021). Opportunities, constraints and critical supports for achieving sustainable local pharmaceutical manufacturing in Africa: With a focus on the role of finance, final report. *Business & Economics Paper*, 21-03. <http://dx.doi.org/10.2139/ssrn.3811733>
- Aggarwal R, & Ranganathan P. (2019). Study designs: Part 2 – Descriptive studies. *Perspectives in Clinical Research* 2019;10:34-6. https://www.researchgate.net/publication/330593863_Study_designs_Part_2_-_Descriptive_studies
- Arushanyan Y, Ekener E, Moberg Å (2017) Sustainability assessment framework for scenarios – SAFS. *Environ Impact Assess Rev* 63:23–34. <https://doi.org/10.1016/j.eiar.2016.11.001>
- Bhatti, Y. & Prabhu, J. 2019. (Accepted & forthcoming) Frugal Innovation and Social Innovation: Linked Paths to Achieving Inclusion Sustainably, In *Handbook of Inclusive Innovation: The Role of Organizations, Markets and Communities in Social Innovation*. Edited by Gerry George, Ted Baker, Paul Tracey and Havovi Joshi: Edward Elgar
- Boyer, Robert H. W., Nicole D. Peterson, Poonam Arora, and Kevin Caldwell. 2016. "Five Approaches to Social Sustainability and an Integrated Way Forward" *Sustainability* 8, no. 9: 878. <https://doi.org/10.3390/su8090878>
- Boarini, R., Kolev, A. & McGregor, A. (2014). Measuring Well-being and Progress in Countries at Different Stages of Development: Towards a More Universal Conceptual Framework", *OECD Development Centre Working Papers*, No. 325, OECD Publishing, Paris, <https://doi.org/10.1787/5jxss4hv2d8n-en>.
- Bulut, C., Eren, H. & Seekin Halac, D. (2013). "Social Innovation and Psychometric Analysis", *Procedia - Social and Behavioral Sciences*, 82, (3): 122-130.
- Barasa, E. (2018). Determinants of socio-economic sustainability of water projects in slum areas in Kenya: A case of Kiambiu slum in Nairobi county. *International Journal of Arts and Entrepreneurship*, 7(2), 66–84.
- Baker, D. (2021). The future of the pharmaceutical industry: beyond government-granted monopolies. *Journal of Law, Medicine & Ethics*, 49(1), 25–29.
- Beck, M., Buckley, J., & O'Reilly, S. (2020). Managing pharmaceutical shortages: An overview and classification of policy responses in Europe and The USA. *International Review of Administrative Sciences*, 86(4), 622–640.
- Buckley, G. J., Gostin, L. O. (2013) Committee on understanding the global public health implications of substandard, falsified, and counterfeit medical products, Board on Global

- Health, & Institute of Medicine. (2013, May 20). *Weaknesses in the Drug Distribution Chain*. National Academies Press (US). <https://www.ncbi.nlm.nih.gov/books/NBK202536/>
- Carvalho, A. D., Cunha, S.K., Lima, L. F., & Carstens, D. F. (2017). The role and contributions of sociological institutional theory to the socio-technical approach to innovation theory. *RAI Revista de Administração e Inovação*, 14, 250–259.
- Chaturvedi, U., Sharma, M., Dangayach, G. S., & Sarkar, P. (2017). Evolution and adoption of sustainable practices in the pharmaceutical industry: An overview with an Indian perspective. *Journal of Cleaner Production*, 168, 1358-1369. <https://doi.org/10.1016/j.jclepro.2017.08.184>
- Cajaiba-Santana, G. (2014). Social innovation: Moving the field forward. A conceptual framework. *Technological Forecasting and Social Change*, 82, 42-51.
- Chiesi Annual & Sustainability Report (2021). Available at: https://www.chiesi.com/en/flipbook.php?url=https://www.chiesi.com/img/annual_report/documenti/74_chiesi_aas_report_2021_en_long_final_.pdf
- Edwards-Schachter, M., & Wallace, M. L. (2017). “Shaken, but not stirred”: Sixty years of defining social innovation. *Technological Forecasting and Social Change*, 119, 64-79. <https://doi.org/10.1016/j.techfore.2017.03.012>.
- Elkington, J. (1997). *Cannibals with forks – Triple bottom line of 21st century business*. New Society
- Goggins G. & Henrike R,(2016). Beyond calorie counting: assessing the sustainability of food provided for public consumption, *Journal of Cleaner Production*, 112, (1):257-266, ISSN 0959-6526, <https://doi.org/10.1016/j.jclepro.2015.06.035>.
- Griggs,D., Stafford-Smith,M., Gaffney, O. et al.(2013). Sustainable development goals. *Nature*, 495:305-307.
- Geissdoerfer, M., Vladimirova, D., Van Fossen, K., Evans, S., 2018b. Product, service and business model innovation: a discussion. *Procedia Manufacturing* 21, 165e172. <https://doi.org/10.1016/j.promfg.2018.02.107>.
- Gitatui, M., Kimani, S., Muniu, S., & Okube, O. (2019). Determinants of harmful use of alcohol among urban slum dwelling adults in Kenya. *African Health Sciences*, 19(4), 2906-2925.

- Goldenberg, M. (2004a). Social innovation in Canada how the non-profit sector serves Canadians and how it can serve them better. Canadian Policy Research Networks Inc. Project (CPRN), Research Report W/25, Ottawa.
- Halla P, Binder CR. Sustainability Assessment: Introduction and Framework. In: Binder CR, Wyss R, Massaro E, eds. *Sustainability Assessment of Urban Systems*. Cambridge University Press; 2020:7-29.
- Hassan, H., Kamaluddin, A., Saad, S., & Samad, N. (2021). The effect of leadership style and innovation capital on SMEs sustainability performance from a managerial perspective. *Journal of Emerging Economies and Islamic Research*, 9(3), 83-97. <https://doi.org/10.24191/jeeir.v9i3.14755>
- Howaldt, J., Schröder, A., Kaletka, C., Rehfeld, D., & Terstriep, J. (2016). Comparative Analysis (Mapping 1). Mapping the World of Social Innovation: A Global Comparative Analysis across Sectors and World Regions. SI-DRIVE Report D1.4. Dortmund: TU Dortmund.
- Islam, M. A., Rashed, C. A. A., & Hasan, J. (2019). Raw materials shortage and their impact on the manufacturing business - an empirical study in the pharmaceutical sector of Bangladesh. *Review of General Management*, 29(2), 128–144.
- Kirwan K., Ilbery B, Maye D., Carey J,(2013). Grassroots social innovations and food localisation: An investigation of the Local Food programme in England, *Global Environmental Change*, 23, Issue (5):830-837, ISSN 0959-3780, <https://doi.org/10.1016/j.gloenvcha.2012.12.004>.
- Jones, S. C., Gordon, C. S., Akram, M., Murphy, N., & Sharkie, F. (2022). Inclusion, exclusion and isolation of autistic people: Community attitudes and autistic people's experiences. *Journal of Autism and Developmental Disorders*, 52, 1131–1142. <https://doi.org/10.1007/s10803-021-04998-7>
- Judit, K. K., Eszter, V., & Gusztáv, N. (2017). Understanding the process of social innovation in rural regions: some Hungarian case studies. *Studies in Agricultural Economics*, 118, 22-29. <http://dx.doi.org/10.7896/j.1604>
- Kajikawa, Y., Tocoa, F., Yamaguchi, K.(2014). Sustainability science: the changing landscape of sustainability research. *Sustain. Sci.* 9, 431–438.
- Karatepe, O. M., Aboramadan, M., & Dahleez, K. A. (2020). Does climate for creativity mediate the impact of servant leadership on management innovation and innovative behavior in the hotel industry? *International Journal of Contemporary Hospitality Management*, 32(8), 2497–2517. <https://doi.org/10.1108/IJCHM-03-2020-0219>
- Katonáné Kovács, Judit and Varga, Eszter and Nemes, Gusztáv (2016) *Understanding the process of social innovation in rural regions*. STUDIES IN AGRICULTURAL ECONOMICS,

- Komiyama, H. and K. Takeuchi (2006) “Sustainability Science: Building a New Discipline”, *Sustainability Science* 1: 1–6.
- Khan, M. M., Mubarik, M. S., & Islam, T. (2020). Leading the innovation: Role of trust and job crafting as sequential mediators relating servant leadership and innovative work behavior. *European Journal of Innovation Management*. <https://doi.org/10.1108/EJIM-05-2020-0187>
- Kiplagat, C. V, & Odollo, L. (2021). Effect of strategic responses on organizational performance of pharmaceutical firms in Nairobi city county Kenya. *International Research Journal of Business and Strategic Management*, 2(3), 1–16.
- Koichiro Mori, Aris Christodoulou, Review of sustainability indices and indicators: Towards a new City Sustainability Index (CSI), *Environmental Impact Assessment Review*, Volume 32, Issue 1, 2012, Pages 94-106, ISSN 0195-9255, <https://doi.org/10.1016/j.eiar.2011.06.001>.
- Lazaretti, K., Giotto, O. T., Sehnem, S., Bencke, F. F., Lazaretti, K., Giotto, O. T., & Sehnem, S. (2019). Building sustainability and innovation in organizations and innovation. *An International Journal*, 41(3), 1–24.
- Lee, H., Kim, S. Y., Kim, G., & Kang, H. Y. (2019). Public preferences for corporate social responsibility activities in the pharmaceutical industry: Empirical evidence from Korea. *PLoS ONE*, 14(8), 1–17.
- Li, Y. (2014). Environmental innovation practices and performance: Moderating effect of resource commitment. *J. Clean. Prod.* , 66, 450–458.
- Maasoumi, E., & Bulut, L. (2012). Predictability and specification in models of exchange rate determination. In X. Chen, & N. R. Swanson (Eds.), *Recent Advances and Future Directions in Causality, Prediction, and Specification Analysis* (pp. 411–436). . Berlin, Germany: Springer.
- Mackintosh M., Mugwagwa J., Banda G., Tibandebage P., Tunguhole J., Wangwe S., & Karimi Njeru M. (2018). Health-industry linkages for local health: Reframing policies for African health system strengthening. *Health Policy Plan*, 33(4), 602-610. doi: 10.1093/heapol/czy022.
- Malhotra, Neil (editor). 2022. *Frontiers in Social Innovation: The Essential Handbook for Creating, Deploying, and Sustaining Creative Solutions to Systemic Problems*. Cambridge, MA: Harvard Business Review
- McKane, A. & Villeneuve, S. (2022). Demographic-reliant Algorithmic Fairness: Characterizing the Risks of Demographic Data Collection in the Pursuit of Fairness. In *2022 ACM*

- Mittler, D. (1999). Environmental space and barriers to local sustainability: Evidence from Edinburgh, Scotland. *Local Environment*, 4(3), 353–365. <https://doi.org/10.1080/13549839908725604>
- Mori, K., & Christodoulou, A. (2012). Review of Sustainability Indices and Indicators: Towards a New City Sustainability Index (CSI). *Environmental Impact Assessment Review*, 32, 94-106. <http://dx.doi.org/10.1016/j.eiar.2011.06.001>
- Moreira P.A.S, Inman, R.A. & Cloninger C.R., (2023). Three joint temperament-character configurations account for learning, personality and well-being: normative demographic findings in a representative national population. *Front. Psychol.* 14:1193441. doi: 10.3389/fpsyg.2023.1193441
- Moulaert, F. (Ed.). (2013). *The international handbook on social innovation: Collective action, social learning and transdisciplinary research*. Edward Elgar.
- Mulgan, G., Tucker, S., Ali, R., & Sanders, B. (2007). *Social innovation: what it is, why it matters and how it can be accelerated*. London:
- Neamtan, N. (2003). Non-profit sector and evaluation: The state of play in Quebec. In OECD (Ed.), *The Non-Profit Sector in a Changing Economy* (pp. 221-238). Paris: OECD
- Neumeier, S. and K. Pollermann (2011) 15 Jahre Später. Wirkungen eines Modellprojekts zur partizipativen Regionalentwicklung. In: *DISP: The Planning Review* 184 (1):29–42
- Organization of Economic Cooperation and Development (OECD) (2005) Oslo manual. Guidelines for collecting and interpreting innovation data (Paris: OECD) <https://www.oecd.org/regional/leed/socialinnovation.htm#:~:text=Social%20innovation%20refers%20to%20the,wellbeing%20of%20individuals%20and%20communities>. Accessed 15/05/2024
- Oluoko-Odingo, A. A., & Mutisya, E. (2019). The Enterprise of Waste management among urban youth for sustainable development in Kenya. *Journal of Sustainability, Environment and Peace*, 1(2), 45–51.
- Pérez, J. G., & Llorente, M. T. P. (2006). Using qualitative indicators of sustainability in Iberoamerican Environmental Research. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 7(4). Art. 33 <https://doi.org/https://doi.org/10.17169/fqs-7.4.172>
- Pourrat, X., Huon, J. F., Laffon, M., Allenet, B., & Roux-Marson, C. (2020). Implementing clinical pharmacy services in france: one of the key points to minimise the effect of the shortage of pharmaceutical products in anaesthesia or intensive care Units? *Anaesthesia*

Critical Care and Pain Medicine, 39(3), 367–368.

Pue, K., Vandergeest, C., & Breznitz, D. (2015). Toward a theory of social innovation. *Innovation Policy Lab White Paper No.* 2016-01.

Purvis, B., Mao, Y., & Robinson, D. (2018). Three pillars of sustainability: In search of conceptual origins. *Sustainability Science*, 14(3), 681–695.
<https://doi.org/10.1007/s11625-018-0627-5>

Reddy, A. & Naude, M. J. (2019). Factors Inhibiting Green Supply Chain Management Initiatives in a South African Pharmaceutical Supply Chain. In Z. Fields & S. Huesig (Eds.), *Responsible, Sustainable, and Globally Aware Management in the Fourth Industrial Revolution* (pp. 306-336). IGI Global. <https://doi.org/10.4018/978-1-5225-7638-9.ch012>

Roy, R., Ali, E. K. F., & Gupta, R. (2021). Sustainability: A Contested model in business practice. *International Journal of Research in Engineering, Science and Management*, 4(2), 62–66.

Shahadu, H. (2016). Towards an umbrella science of sustainability. *Sustainability Science*, 11(5), 777–788. <https://doi.org/10.1007/s11625-016-0375-3>.

Steele, P. Ali, G. K. M., Levitskiy, A., & Subramanian, L. (2020). *A case for local pharmaceutical manufacturing in Africa in light of the COVID-19 pandemic*. Pamela Steele Associates https://www.childhealthtaskforce.org/sites/default/files/2021-08/20200715_LocalPharmaManufacturingInAfrica.pdf

Soule M.C. Defining Social Innovation // Stanford Business. URL: <https://www.gsb.stanford.edu/faculty-research/centers-initiatives/csi/definingsocial-innovation> (accessed: 15.11.2020).

Srivastava, M.K. Presented: 2021 Experimental Thinking in Observational Studies in Brown Bag Series, College of Business, Michigan Tech

Shahadu, H. (2016). Towards an umbrella science of sustainability. *Sustain Sci*, 11(5), 777–788. <https://doi.org/10.1007/s11625-016-0375-3>

Schoolman, Ethan D., Jeremy S. Guest, Kathleen F. Bush and Andrew R. Bell. “How Interdisciplinary is Sustainability Research? Analyzing the Structure of an Emerging Scientific Field.” *Sustainability Science* 7: 67-80.2012

- Sjöström M, Östblom G (2010) Decoupling waste generation from economic growth - a CGE analysis of the Swedish case. *Ecol Econ* 69:1545–1552. <https://doi.org/10.1016/j.ecolecon.2010.02.014>
- Swarnakar, V., Bagherian, A. and Singh, A.R. (2022), “Modeling critical success factors for sustainable LSS implementation in hospitals: an empirical study”, *International Journal of Quality and Reliability Management*, Vol. 39 No. 5, pp. 1249-1280, doi: 10.1108/IJQRM-04-2021-0099.
- Tanimoto, K., & Doi, M. (2007). Social innovation cluster in action: A case study of the San Francisco Bay Area. *Hitotsubashi Journal of Commerce and Management*, 41(1), 1-17.
- Van Wijk J., Zietsma C., Dorado S., de Bakker F. G. A., & Martí, I. (2019). Social Innovation: Integrating micro, meso, and macro level insights from institutional theory. *Business & Society*, 58(5):887-918. <https://doi.org/10.1177/0007650318789104>
- Wafula, S.T., Musiime, J. and Oporia, F. (2019) Healthcare Waste Management among Health Workers and Associated Factors in Primary Healthcare Facilities in Kampala City, Uganda: A Cross-Sectional Study. *BMC Public Health*, 19, Article No. 203. <https://doi.org/10.1186/s12889-019-6528-4>
- Waleng, N.J. & Nomngongo, P.N. (2022). Occurrence of pharmaceuticals in the environmental waters: African and Asian perspectives. *Environmental Chemistry and Ecotoxicology*, 4, 50-66. <https://doi.org/10.1016/j.enceco.2021.11.002>.
- Yong-Ha, K., & Young-Taek, K. (2020). Determinants of sustainability performance in pharmaceutical distribution industry. *Journal of Distribution Science*, 18(12), 91–100.
- Ziegler, R. 2017. “Citizen Innovation as Niche Restoration – A Type of Social Innovation and Its Relevance for Political Participation and Sustainability.” *Journal of Social Entrepreneurship* 8 (3) 338–353.
- Zijp, M.C.; Heijungs, R.; Van der Voet, E.; Van De Meent, D.; Huijbregts, M.; Hollander, A.; Postuma, L.(2015). An identification key for selecting methods for sustainability assessments. *Sustainability*. 7:490-2512.