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Rural Development

Education, Sustainability, Multifunctionality

Edited by Paola de Salvo
and Manuel Vaquero Piñeiro

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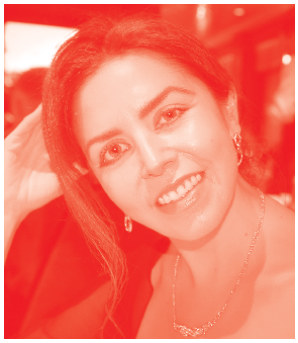

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Meet the editors

Paola de Salvo, Ph.D. in Social Systems and Public Policy Analysis, teaches sociology, promotion of territory, and urban and rural sociology at the Department of Political Science, University of Perugia, Italy. Her main research interest is focused on the study of local development, in particular to the study of territory development as a process that links the socio-economic and cultural aspects to sustainable development, which gives value to the sense of place, identity-local, narrations, and values.

Manuel Vaquero Piñeiro was awarded a Ph.D. in Modern and Contemporary History by the University of Cantabria (Spain); since 2006, he is a professor of economic history at the University of Perugia, Italy (manuel.vaqueropineiro@unipg.it). In 2010, he received the international award, Daria Borghese, for studies on the history of the Renaissance in Rome. Among his main research interests includes the socioeconomic transformation of agriculture.

Contents

Preface

The volume brings together a series of contributions with the common goal of reflecting the links between economic development and rural development in developing countries. Since international aid programs aimed at eradicating hunger began to proliferate in the second half of the twentieth century, a rich debate on the strategies and tools to be adopted to make the great escape from poverty and backwardness is underway. The works of Robert W. Fogel, Angus Deaton, and Amartya Sen, to mention only a few authors, testify to the centrality of the problems that are addressed in the chapters that make up this book. The strategies to be adopted to help the countries that have lagged behind fueled an intense and controversial debate since the insurmountable obstacles to development, as evidenced by the extensive scientific literature available, are the realities present in the socio-economic structures of a large number of countries. Even though the data available are still few, it is assumed that the Covid-19 pandemic will make a landscape already full of criticalities even more fragile. Being on a scenario dotted not only with old and new wounds but also with innovative paths to be taken in an attempt to overcome existing delays, the chapters of the book composed scenarios full of case studies concerning the African and Asian continents. Spaces that continue to be confirmed as regards policies to be adopted in an attempt to trigger virtuous processes of economic growth and social well-being, unfortunately one could say, are in the field of observation and experimentation. Without wishing of making an exhaustive presentation of each individual work, there are a number of common themes. First of all, it continues to be important to develop broad visions on policies conducive to economic growth. In this concrete case, some classic issues are addressed, such as the results, although still quite irregular, achieved by the development plans that have been drawn up in India since the second half of the last century (Kazma Khan). If in the seventies the concept of rural development appeared almost exclusively linked to the modernization of agriculture, today the concept has undergone changes to become an articulated category that integrates economy, politics, and quality of life. At the end of the era of ideological conflict, from a theoretical point of view, the Indian case, as well as that of many other countries, indicates that poverty and underdevelopment are fought by stimulating economic growth, but the questions related to the conditions for having the takeoff were advocated by Walt W. Rostow as the real keystone. Collins Ayoo's essay presented a broad and detailed examination of the factors that could favor the transfer of monetary resources (i.e., trade, tourism, emigration, and tax policies) and entrepreneurial strengthening of small farmers and rural artisans. The Lawal–Adebowale exam on the validity of applying the Chinese model in African countries fits into this scenario. Taking Nigeria as the subject of the case study, we have analyzed the difficulties of breaking the vicious circle of poverty made up of poor infrastructures, illiteracy, low-productivity agricultural livelihood, agricultural programs inadequate to create surpluses for exports, and international trade. Therefore, the Chinese model appeared to be a distant reference point due to the strong political instability and the predominance of contexts that are hardly favorable to the introduction of in-depth changes. The 2019 data provided by the UN on the growth of malnutrition in Africa, up compared to the decreasing trend of previous years, show that we are far from achieving one of the main objectives of the 2030 agenda for sustainable development. The second block of contributions goes into the merits of some of the issues that make up the great theoretical overview.

Austine Phiri stressed the role of information considered a requirement for economic development. Talking about the circulation of and access to information implies overcoming the barriers that limit the spread of information and communications technology (ICT) in many countries. Policies must aim at eliminating the obstacles that prevent African farmers and ranchers from being able to make full use of the benefits of information technology. In the e-agriculture community and the communities that train farmers, exchange the information in agriculture using ICT can foster sustainable development. At first glance, and because of the starting point, the goal may seem quite utopian, but in some countries such as Namibia thanks to the creation of a mobile library service, the rural population has access to the Internet and technical readings on agriculture, livestock, and the environment. It is no coincidence that a central role is assigned to education. This is confirmed by the contributions of Jacob Alhassan Hamidu and others. In rural areas, full and regular schooling is a goal still far from being achieved. The relationship between school attendance rates and economic development is well known. If school absenteeism represents a strongly dividing social factor, the strategies implemented in the less-equipped rural areas constitute a challenge for African countries because in many cases it involves establishing a dialogue with the communities with the aim of developing programs that make schooling compatible with cultural and environmental conditioning. The limits to learning and taking full advantage of school education, in many cases, involve introducing dietary changes. The projects aimed at distributing to infant population foods rich in omega-3, an essential component for promoting cognitive processes, are placed in this perspective. The range of solutions to be adopted has been enriched in recent years. This is demonstrated by the work of Gede Sedana, *Rural Development on the Agricultural Institution Basis: Case of the Agricultural Development in Bali Province, Indonesia*, on the impact of tourism on the province of Bali in Indonesia. Rural tourism raises several problems. It is true that in the Western countries the practice of rural tourism has consolidated, but transferring this approach to more fragile social and environmental realities can prove to be an operation that presents numerous critical issues including several critical points. The Indonesian region, world-famous for the suggestive terraces destined for the cultivation of rice, offers a clear case study of the full identification between rural development and agricultural sector. Also, in this case, the agricultural results achieved are quite limited due to a general lack of technological mastery applied to agriculture (seeds, fertilizers, pesticides). In a scenario where the vicious circle of family farming for self-consumption dominates, the practice of tourism could prove to be a valid alternative as long as you know how to create a perfect coexistence between the two worlds, that of international tourism and that of the small village community. Even in extremely fragile rural contexts, the practice of tourism could prove, in the subtle term, a solution full of negative implications in terms, for example, of consumption of natural resources, such as water and soil, and pollution, better, as the author points out, to undertake the slower road to modeling village agro-industry. We arrived at the latest study of Paola de Salvo and Manuel Vaquero Piñeiro that indicates some of the terms of the current search for a balance between rural society and sustainable development.

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Chapter 1

Dynamics of Rural Development in India

Kazma Khan

Abstract

India is the second largest populous country in the world and more than half of its population lives in rural areas. This leads to widespread unemployment, low standard of living, inadequate productive skills and malnutrition in the country. In the developing countries especially like India, rural development is always been an important issue related to country's economic progress. The rural development programmes are the key devices for the development of the rural areas in the country. As we know that, the people of rural area have seen difficulties from the time immemorial, the time has come to give them their deserving rights. India cannot shine without the shinning of the Rural India. National Development is almost synonymous with the Rural Development. This paper makes an attempt to measure actual performance and Government's initiatives to accelerate the process of rural development through rural development programme in India and would be dealing with the changing life of the vulnerable people. The study reveals that the target number of houses to be constructed by the year 2021–2022, is 2.95 crore. The target set is to be achieved in phases and in the 1st phase 1 crore houses have been taken up for construction and in the 2nd phase 1.95 crore houses are being taken up for construction. 35.27 lakh houses have been constructed during 2020–2021 under Pradhan Mantri Awaas Yojana (PMAY-G) scheme. The pace of construction of PMGSY roads a nine years high of 135 kms per day in 2018–2019 as against an average of 73 kms during the period 2011 to 2014. Hence, the pace of construction has increased by 93%. Under PMGSY about 6, 26,910 Km road length completed where as 41000 Km road length constructed by using green technology and 14312 Km road length constructed by using plastic waste. MGNREGA has provided employment to 6.9 crore households by generating more than 305.71 crore person-days of wage employment covering 74.74 lakh works during financial year 2020–2021 and 5 crore works completed since inception. During COVID-19 pandemic, migrant workers were allowed to work under the scheme by being applying for job card. Approximately 1.44 crore Job Cards have been issued in FY 2020–2021. Total person-days generated in FY 2020–2021 have been 305.71 crore against approved LB for FY 2020–2021 of 333.09 crore. There has been 47% increase in person-days generated in comparison to FY 2019–2020. Further, the paper will give an idea how it will be beneficial for our country and how this little effort to rebuild the rural life and livelihood will make our country from developing to the developed country.

Keywords: Rural development, unemployment, poverty, Government, Vulnerable Life, Programmes

1. Introduction

> *"Just as the whole universe is contained in the self, so is India contained in the villages."*
>
> *Mahatma Gandhi*

Rural development is the process of improving the quality of life and economic well-being of people living in rural areas**.** It aims at improving the well being and self realization of people living outside the urbanized areas through collective process. According to Agarwal (1989), rural development is a strategy designed to improve the economic and social life of rural poor [1]. Rural Development has been receiving increasing attention of the governments across the world. In the Indian context, rural development assumes special significance for two important reasons. First, about two-thirds of India's population still lives in villages and there cannot be any progress so long as rural areas remain backward. Second, the backwardness of the rural sector would be a major impediment to the overall progress of the economy.

The all India Rural Credit Review Committee in its report warned "If the fruits of development continue to be denied to the large sections of rural community, while prosperity accrues to some, the tensions social and economic may not only upset the process of orderly and peaceful change in the rural economy but even frustrate the national efforts to set up agricultural production." Report of the All India Rural Credit Committee, New Delhi, 2003 has rightly pointed out that a purely agricultural country remains backward even in respect of agriculture.

Today, Inclusive rural development is more specific concept than the concept of rural development of earlier, in broader terms, inclusive rural development is about improving the quality of life of all rural people. More specifically, inclusive rural development covers three different but interrelated dimensions: Economic dimension, Social dimension and Political dimension. Economic dimension encompasses providing both capacity and opportunities for the poor and low-income households in particular, benefit from the economic growth. Social dimension supports social development of poor and low- income households, promotes gender equality and women's empowerment and provides social safety nets for vulnerable groups. Political dimension improves the opportunities for the poor and low income people in rural areas to effectively and equally participate the political processes at the village level [2].

Rural development implies both the economic betterment of people as well as greater social transformation. In order to provide the rural people with better prospects for economic development, increased participation of people in the rural development programmes, decentralization of planning, better enforcement of land reforms and greater access to credit are needed. This article provides complete information on initiatives taken by the government for bridging the urban–rural divide by upgrading the standard of living of people in rural areas.

2. Objectives

- The main objective of the study is to understand the role of rural development schemes in India.

- The secondary objective includes, presenting the growth of number houses completed under PMAY-G Scheme, to study the increase of road length

completed under PMGSY Scheme and to evaluate employment provided to households and individuals under MGNREGA Scheme etc. and key achievements of various schemes with special response given by the Government of India during Covid-19.

3. Scope of the study

The Government of India has been launched the various schemes for the development of rural areas. The present study confine to mainly few schemes like Pradhan Mantri Awaas Yojana Gramin (PMAY-G) scheme is to provide houses, Pradhan Mantri Gram Sadak Yojana (PMGSY) to build roads and Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) to provide employment to rural population and Deendayal Atyodaya Yojana- National Rural Livelihoods Mission (DAY-NRLM) to access gainful self-employment opportunities.

4. Methodology

The present study is based on the secondary sources of data. Data have been collected from various rural development institutions, annual reports, published books and research papers. In order to formulate the study meaningful and empirical tables were used. Various Development Programmes are used for appraising real performance of rural development in India.

5. Rural development in India preindependence

Rural development in India before independence can be analysed under two main heads:

Efforts made by the British Government:

- It was the famine of 1899 which forced the British Government to think about the people of India who were dying of hunger [3].

- Removal of Barter system: The traditional barter system received a severe setback during the British period. British government introduced cash economy, which enabled the peasants to adopt commercial crops. In this way agricultural subsistence gave rise to commercial crops.

Efforts made by voluntary organizations:

- **Sriniketan Experiment:** Shri, Rabindranath Tagor in 1908 establish youth organization in the kaligram Progana of his Zamindari [4]. This was a very comprehensive programme combining culture, health, education and economic aspects of village life together [5].

- **The Martandam Experiment:** The aim of this project was to bring more abundant life to the rural people. It was intended to symbolize the three-fold development, not only spiritual, mental and physical but also economic and social [6]. The essential technique of the centre was 'Self-help with intimate expert counsel'. From the demonstration centre at Martandam, about a hundred villages were covered through Y.M.C.A. centres in villages.

- **The Gurgaon Experiment:** It was started by Mr. F.L. Brayne, Deputy Commissioner in the Gurgaon district of Punjab State as he was prompted by the backwardness, poverty and misery of the people. Introduction of this programme has improved seeds, implements, the methods of cultivation, etc.

- **Gandhian Constructive Programme/ Sewagram:** The dream of the Gandhiji was to see the village as self - contained and self sufficient. Therefore, for the betterment of people Gandhiji formulated 18 programmes, which includes the promotion of village industries, basic and adult education in rural areas, upliftment of backward tribes, upliftment of women, education in public health and hygiene, propagation of natural language, love for the mother tongue, economic equality, organization of kisans, labour and students and so on.

- **Rural Reconstruction Programmes in Baroda:** The Maharaja of Baroda was started the Baroda experiment in 1932. This programme aimed at developing "will to liv**e** better" and a capacity for the self-help and self-reliance.

- **The Firka Development scheme:** The Firka Development scheme of Madras was a Government sponsored scheme in 1946. This programme aimed at organizing the villages for a happier, more prosperous and fuller life in which the individual villagers had the opportunity to develop both as an individual and as a unit of a well- integrated society.

6. Programmemes launched by the government of India after independance

As Gandhiji has quoted that, *"If villages prosper the country will prosper, if villages, sink the country will sink"*, emphasizing on this line, for the development of India, village has to be developed. Department of Rural Development has implemented a number of programmes in the rural areas through the State Governments for the poverty reduction, employment generation, rural infrastructure habitant development, provision of basic minimum services [7]. The policy makers have realized the importance of rural development and have been implementing a host of programmes as shown in **Table 1**.

The Ministry of Rural Development has been given the mandate for undertaking interventions for integrated and sustainable rural development with the main focus on skilling of rural youth, increasing livelihood opportunities, empowering rural women and expanding livelihood opportunities, providing social safety net and infrastructure development.

The aim is to alleviating rural poverty, generating employment and removing hunger and malnourishment accompanied to improvement of the quality of human life. The basic goals are Connecting the unconnected habitations through good quality all weather roads, consolidation and up-gradation of existing rural road network adopting green technologies, Pucca houses with basic amenities to rural houseless/households living in Kuccha houses, Promotion of sustainable practices in Agriculture (Climate change resilient Agro Ecological Practices) NTFP, Livestock and other farm-based activities, Engaging with SHGs for higher order economic activities, Skill training for self and wage employment for remunerative jobs, Extend universal coverage to all the deprived sections, including small and marginal farmers and unorganized workers and Developing growth clusters & Gram Panchayats as hubs of economic activity through convergence of Government Schemes. While the government has been giving top priority to rural development

Year	Name of Schemes
1948	The Etawah Pilot Project/ The Nilokheri Experiment/The Bhoodan Movement.
1951	First Five Year Plan launched.
1952	Community Development Program launched.
1958	Three-tier Structure of local self-governing bodies (Panchayati Raj) introduced.
1969	Rural Electrification Corporation set up.
1971	"Garibi Hatao" initiated.
1972	Pilot Intensive Rural Employment Project (PIREP).
1973	Accelerated Rural Water Supply Program (ARWSP)/Drought Prone Areas Programs (DPAP).
1977	Food for Work Program and Desert Development Program (DDP).
1978	Integrated Rural Development Program (IRDP).
1979	Training of Rural Youth for Self Employment (TRYSEM).
1980	National Rural Employment Program (NREP).
1982	Development of Women and Children in Rural Areas (DWCRA).
1985	Indira Awaas Yojana (IAY) started
1986	"National Drinking Water Mission" (NDWM) {rechristened as "Rajiv Gandhi National Drinking Water Mission" (RGNDWM) in 1991}.
1988	"Bekari Hatao" initiated and Million Wells Scheme (MWS).
1989	Jawahar Rozgar Yojana (JRY).
1992	Constitutional 73rd Amendment Act to grant constitutional status to the Panchayati Raj institutions.
1993	Employment Assurance Scheme (EAS).
1995	National Social Assistance Program (NSAP).
1999	Jawahar Gram Samridhi Yojana (JGSY)/Swarnjayanti Gram Swarozgar Yojana (SGSY).
2000	Pradhan Mantri Gram Sadak Yojana (PMGSY)/Annapurna Scheme.
2001	Sampoorna Grameen Rozgar Yojana (SGRY).
2004	National Food for Work Program.
2005	Bharat Nirman/Common Minimum Program/Varsha Bima Scheme.
2006	National Rural Employment Gurantee Act (NREGA).
2011	DeenDayal Antiyodya Yojana- National Rural Livelihood Mission (DAY-NRLN).
2014	Saansad Adarsh Gram Yojana (SAGY)/Deen Dayal Upadhyay Grameen Kaushal Yojna (DDU-GKY).
2016	Shyama Prasad Mukherji Rurban Mission (SPMRM)
2018	Gram Samridhi Evam Swachhta Pakhwada.

Source: Ministry of Rural Development: rural.nic.in [8].

Table 1.
List of Rural Development Programme after Independence in India.

and spending thousands of crores through various schemes. Government of India has made a provision of Rs 131519.08 Crore for Rural Development in its Budget for 2021–2022. With an aim to achieve poverty free Gram Panchayat, rural development expenditure has been substantially enhanced from Rs. 52,000 crore in 2012–2013 to Rs. 1,97,376.5 crore in 2020–2021, an increase of 279% as shown in **Figure 1**. Further, the Ministry of Rural Development targets an expenditure of Rs. 1, 31,519 crore during 2021–2022. In 2012–2013 the fund for NRLM-Aajeevika was

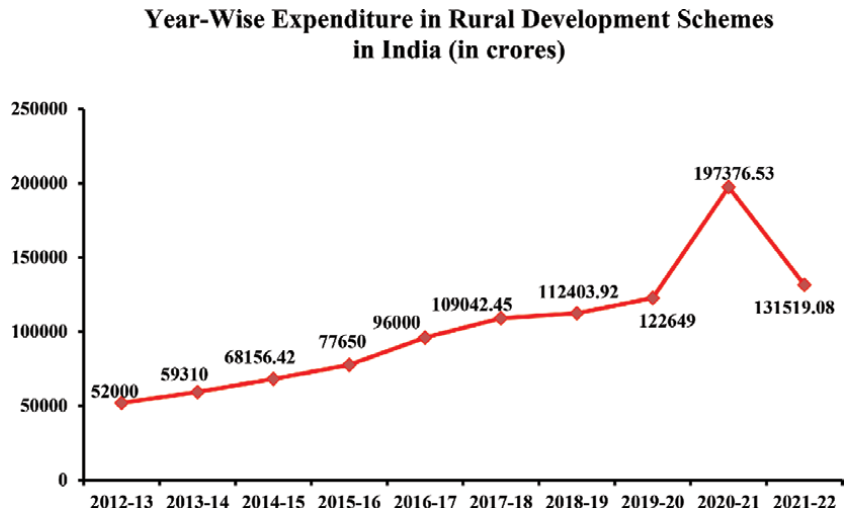

Figure 1.
Year-Wise Expenditure in Rural Development Schemes in India (in crores). Source: Annual Reports (2012–2013 to 2020–2021), Ministry of Rural Development, Government of India.

Rs. 2600 crore which reaches around Rs.13677.6 for the FY 2021–2022. An allocation of Rs 19500 Crore has been made for Pradhan Mantri Awaas Yojana -Grameen and Rs 15000 Crore for Pradhan Mantri Gram Sadak Yojna. Around Rs. 9200 Crore has been allocated for NSA Programme in 21–22 budget as shown in **Table 2**.

6.1 Mahatma Gandhi national rural employment guarantee scheme (MGNREGS)

Mahatma Gandhi NREGA was notified on September 7, 2005. The Scheme aims at enhancing livelihood security of households in rural areas of the country by providing at least one hundred days of guaranteed wage employment in a financial year to every household whose adult members volunteer to take up unskilled manual work. The scheme came into force initially in 200 districts with effect from 2nd February 2006, and was extended gradually to other areas notified by the Central Government. Now the scheme covers the entire country except for districts that have a 100% urban population. The Mahatma Gandhi NREGA is a powerful instrument for ensuring inclusive growth in rural India through its impact on social protection, livelihood security and democratic empowerment.

The Rural Development department has been able to generate unprecedented employment opportunities for unorganized labourers in rural areas through its schemes. The government's commitment to ensure effective implementation of Scheme is reflected by the continuous increase in budget allocation. Total Budget allocation in the financial year 2020–2021 was 61,500 crore and a provision of Rs 73,000 Crore for F.Y 2021–2022 which is highest since inception as compared to the previous financial years. The total expenditure in the financial year 2020–2021is about Rs 82,425 crore which is highest ever since inception as shown in **Figure 2**. In the F.Y 2020–21, 6.9 crore households have been provided employment and in the process 305.71 crore person-days of employment have been generated. Women have accounted for an average of 52.6% of the total person-days generated in MGNREGA, while SC/ST households have contributed to a total of 38%. To strengthen the livelihood resources base of the rural poor, the focus of the scheme is on creation of productive assets of prescribed quality and durability under the scheme.

Scheme Name	List of Sanctions order for the Scheme during 2011–2012 to 2020–2021 sanction order (Amount Rs. in cr)									
	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022
MGNREGA	29387.00	33000.00	33000.00	36967.00	47499.00	55000.00	61084.09	71001.81	1111500.0	73000.00
NRLM-Aajeevika	2600.00	2600.00	2186.42	2672.00	3000.00	4350.00	5783.50	9024.00	9210.04	13677.61
PMAY-G	9024.00	13184.00	11000.00	10025.00	16000.00	23000.00	19900.00	18475.00	19500.00	19500.00
PMGSY	10000.00	9700.00	14200.00	18291.00	19000.00	16900.00	15500.00	14070.07	13706.23	15000.00
Grants to NIRD	47.00	33.00	30.00	50.00	50.00	50.00	75.00	100.00	80.50	124.00
Assistance to C.A.P.A.R.T.	12.00	0.00	6.00	10.00	20.00	20.00	17.60	19.07	0.00	0.00
Management support to RD Programmes and strengthening district planning process	145.00	84.00	125.00	130.00	255.00	250.00	254.40	350.62	341.44	364.38
SECC Survey	375.00	306.00	365.00	330.00	375.00	80.18	386.95	1.00	0.01	0.01
National Social Assistance Programme	0.00	0.00	7241.00	9082.00	9500.00	8744.57	8900.39	9200.00	42617.22	9200.00
Shyama Prasad Mukherjee RURBAN Mission	0.00	0.00	2.00	60.00	300.00	600.00	451.03	300.00	372.33	600.00
Grameen Vikas Bhawan	0.00	0.00	1.00	33.00	1.00	5.25	5.25	54.90	0.00	0.00
Non Scheme (Sectt)	410.00	403.00	0.00	0.00	0.00	42.45	45.71	52.53	48.76	53.08
Total (Plan) (RD)	**52000.00**	**59310.00**	**68156.42**	**77650.00**	**96000.00**	**109042.45**	**112403.92**	**122649.00**	**197376.53**	**131519.08**

Source: Annual Reports (2012–2013 to 2020–2021), Ministry of Rural Development, Government of India [9].

Table 2.
Rural Development Programmes in India.

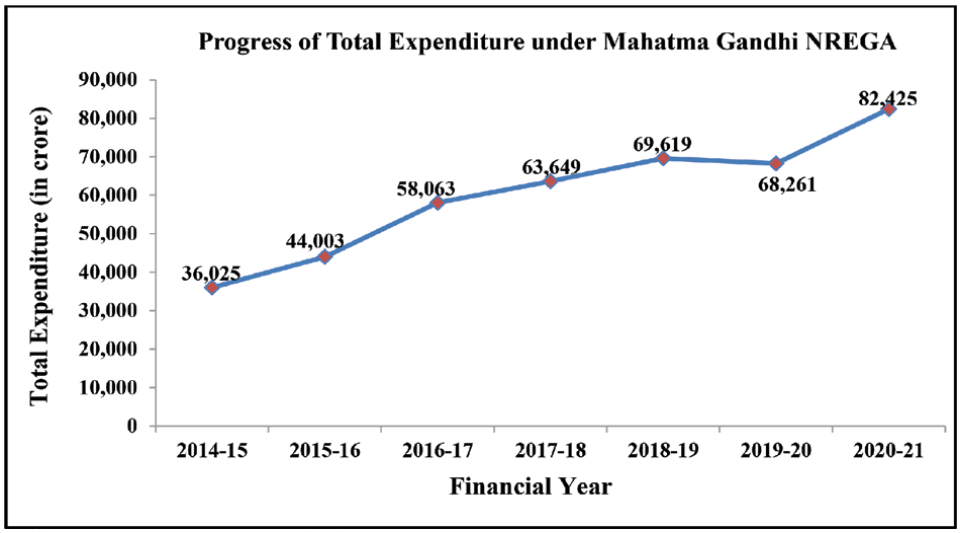

Figure 2.
Progress of Total Expenditure under Mahatma Gandhi NREGA. Source: Annual Reports 2020–2021, Ministry of Rural Development, Government of India

During COVID-19 pandemic, migrant workers were allowed to work under the scheme by being applying for job card. Approximately 1.44 crore Job Cards have been issued in Financial Year 2020–2021. Total persons-days generated in FY 2020–2021 have been 305.71 crore against approved LB for FY 2020–2021 of 333.09 crore. There has been 47% increase in person-days generated in comparison to FY 2019–2020.

6.2 Garib kalyan rojgar abhiyaan (GKRA)

Garib Kalyan Rojgar Abhiyaan (GKRA) was launched on 20th June, 2020 for a period of 125 days to boost employment and livelihood opportunities for migrant workers returning to villages and similarly affected citizens in rural area. The key objectives of this Abhiyaan were to provide immediate employment opportunities to returnee migrants and similarly affected citizen in rural areas, to saturate villages with public infrastructure and assets, to set Stage for enhancing long-term livelihood opportunities. The Scheme has helped in empowering villagers with livelihood opportunities in the selected 116 districts of 6 states namely Bihar, Jharkhand, Madha Pradesh, Odisha, Rajasthan and Uttar Pradesh. During the Abhiyaan, 50.78 crore person-days were generated with a total expenditure of Rs.39, 293 crore.

6.3 Deendayal atyodaya yojana- national rural livelihoods mission (DAY-NRLM)

The Hindi word 'antyodaya' is a combination of two words- ant meaning end or bottom level and udaya meaning development. Thus, as a whole, it implies the development or welfare of a person standing at the end of that queue (lowest level), that is, the poorest of the poor.

DAY-NRLM is a centrally sponsored programme which was launched in June 2011 with the aim to reduce poverty through promotion of diversified and gainful self employment and skilled wage employment opportunities resulting in appreciable increase in the incomes of rural poor on sustainable basis. NRLM continued to

register significant progress in all components during 2020–2021. Intensive activities of the Mission were initiated in 229 new blocks, taking the cumulative footprint to 6321 blocks. Cumulatively up to December, 2020, the Mission has mobilized about 7.26 crore households into 66.03 lakh Self Help Groups (SHGs). The total number of promoted VO is 3.78 lakh, while the number of Cluster Level Federations (CLFs) stood at 323,201. Cumulatively total capitalization support of Rs.12195.13 crore was provided to the community institutions. Further SHGs have leveraged a loan of 3.47 lakh crore from the banks since 2013-14.

This Mission has been strengthening livelihoods by intervention in agro-ecological practices, improved livestock rearing and sustainable Non-timber forest products collection and value addition. 38.05 lakhs farmers have been covered under Mahila Kisan Sashaktikaran Pariyojana (MKSP) till December, 2020. A total of 84 MKSP projects spread over across 24 States, 238 districts, 1319 blocks and 30,900 villages are currently being implemented. The total outlay of the projects is Rs. 1290 Crores covering around 38.05 lakh Mahila Kisans.

In order to support rural youth to take up local entrepreneurship, Start-up Village Entrepreneurship Programme (SVEP) was launched as a sub-scheme of DAY-NRLM in 2014. SVEP is expected to support creation and strengthening of about 2.00 lakh village enterprises in 153 blocks across 23 States. Till 31st December 2020, a total of 1,25,595 enterprises have been supported in these states [10].

6.4 Aajeevika grameen express yojana (AGEY)

Launched in April 2017 aims to provide safe, affordable and community monitored rural transport services to connect remote rural villages, a total of 1357 vehicles were operational in 23 States till December 2020.

The mission is working on the development of transaction system for SHGs and their Federations to track the member level savings, inter-lending, borrowings and repayments etc. It is expected that this system will enable both the Mission and the banks to monitor the health of the SGHs and their federations better.

6.5 Pradhan mantri gram sadak yojana (PMGSY)

launched on 25th December, 2000 for providing connectivity by way of all weather road to the eligible unconnected habitations as per core-network with a population of 500 persons in plain areas. As rural roads are vital for the economic growth and measure for poverty alleviation in the village, Government has launched a 100% Centrally Sponsored Scheme called the Pradhan Mantri Gram Sadak Yojana. The programme seeks to provide connectivity to all unconnected habitations in the rural areas with a population of more than 500 persons through good All-weather roads by the end of the Tenth Plan Period. The rural connectivity is a key factor in ensuring sustainable poverty reduction and integration of rural areas into the mainstream economic growth and development. **Figure 3** presents the road length completed during last more than one decade from 2009 to 2010 to 2020–2021.

The data shows that the length completed has increased from 2, 47,766 Km in 2009–2010 to 6, 26,910 Km during the year 2020–21in the last twelve years of period. The overall achievements of this scheme are as follows

- 98.45% of eligible and feasible habitations provided with all-weather road connectivity.

- 100% sanction of PMGSY-II; 35,072 Km (70.39%) completed.

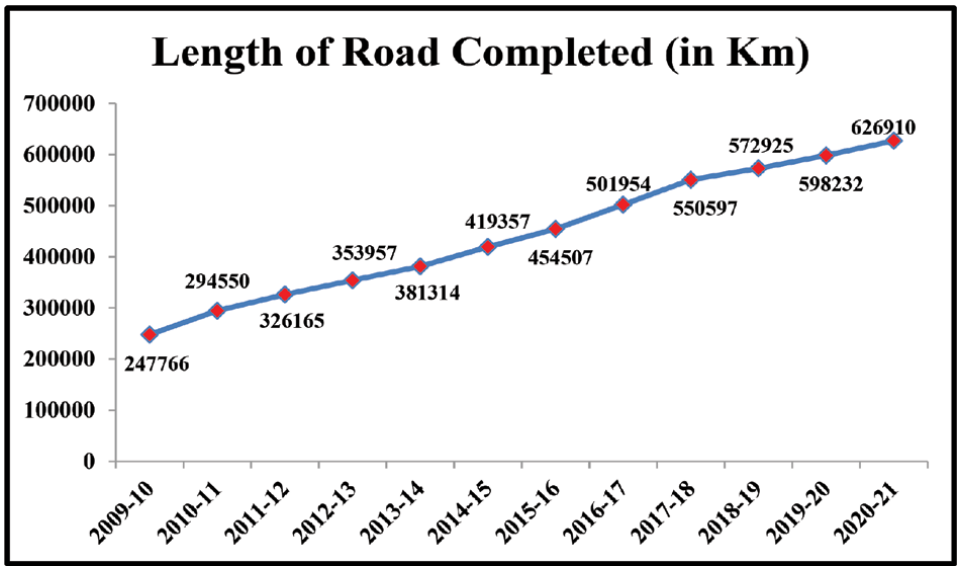

Figure 3.
Length of Road Completed (in Km). Source: Annual Reports of Pradhan Mantri Gram Sadak Yojana- 2020-2021, Ministry of Rural Development, Government of India.

- Under Road Connectivity Project for Left Wing Extremism Affected Areas (RCPLWEA) 9,338 Km sanctioned; 1,877 Km completed.
- Phase-III of PMGSY launched for consolidation of 1, 25,000 Km through Routes and Major Rural Links connecting habitations, inter-alia, to Gramin Agricultural Markets (GrAMs), Higher Secondary Schools and Hospitals.
- Total 6, 26,910 Km road length constructed.
- 41,000 Km road length constructed using green technology.
- 14,312 Km road length constructed using plastic waste.

7. Pradhan mantri awaas yojana gramin (PMAY-G)

To realise the government's commitment towards ensuring "Housing for All" by 2022, the erstwhile rural housing scheme of Indira Awaas Yojana (IAY) has been restructured into Pradhan Mantri Awaas Yojana- Gramin (PMAY-G) with effect from 1st April, 2016. To ensure saturation, the target number of houses to be constructed by the year 2021–2022, is 2.95 crore. The target set is to be achieved in phases and in the 1st phase 1 crore houses have been taken up for construction over a period of 3 years i.e. 2016–2017 to 2018–2019. In the 2nd phase 1.95 crore houses are being taken up for construction over 3 years from 2019 to 2020 to 2021–2022. Under PMAY-G, assistance of Rs. 1, 20,000/– in plains and Rs. 1, 30,000 in hilly states, difficult areas and IAP districts is provided for construction of the house.

The above data indicates that, the number of houses completed has increased from 10, 78,065 during 2012–2013 to 35, 27,176 in 2020–2021 in almost last one decade. Highest number of houses completed in the year 2018–2019 as shown in **Figure 4**.

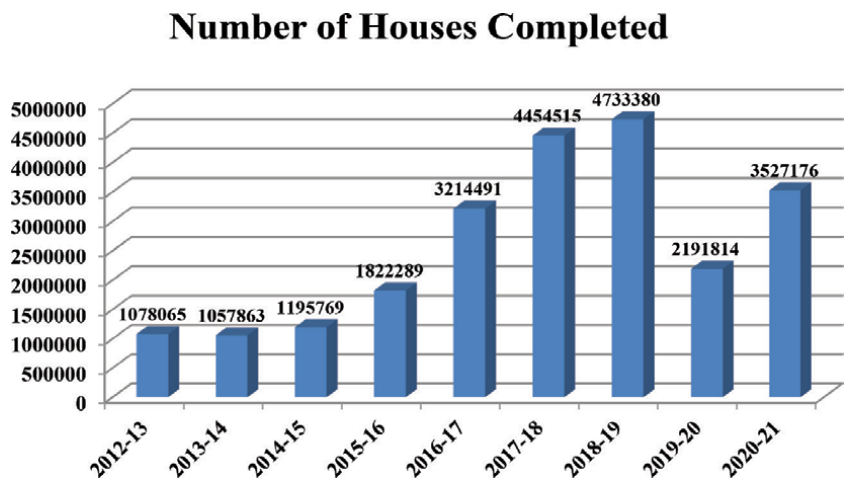

Figure 4.
Number of houses Completed. Source: PMAY-G Cumulative Progress report 2020-2021, Ministry of Rural Development, Government of India [11].

As far as achievement under Rural Mason Training is concerned, as on 8th January 2021 a total of 1,79,489 candidates have been enrolled for mason training out of which 1,43,250 have been assessed and 1,01,644 have been certified under Rural Mason Training (RTM0 Programme. In addition, at the national level, 60% of the target is to be earmarked for SC/ST households. To maintain this, 60% of the target allocated to each State/UT should be earmarked for SC/ST subject of availability of eligible PMAY –G beneficiaries in the Permanent Wait List (PWL). As of 21st January 2021, out of the total 1, 87, 96,844 houses sanctioned, 41, 54,073 houses were sanctioned for SCs and 41, 58,987 sanctioned for STs across the country. Further, out of total 1, 26, 25,294 houses completed, 30, 45, 06 houses were completed for SCs and 30, 72,647 completed for STs across the country. Further, as far as possible, 15% of the total fund would be earmarked for minorities at the National Level, as on 21st January 2021, out of the total houses sanctioned, 23,14,739 houses were sanctioned for Minorities and 14,96,183 got completed across the country since the inception of this scheme. In addition, the state to the extent possible may ensure that 5% of beneficiaries at the State Level from among persons with disabilities. On 21st January 2021, a total of 29,144 houses have been sanctioned for the physically and mentally disabled and out of which 22,211 houses have been completed (Annual Report, 2020–2021, GOI).

8. Response to Covid-19

The key achievements and action for covid-19 mitigation through various schemes by the GOI are:

- **PRADHAN MANTRI GARIB KALYAN YOJANA**

1. **Cash transfers to women PMJDY A/c holders:** A total of 20.65 crore PMJDY women account-holders would be given an ex-gratia of Rs. 500 per month for entailing three months. Total expenditure is Rs. 31,000 Crores.

2. **Support for senior citizens, widows and divyang:** Rs.1000/– each to 2.82 crore aged widows and people in Divyang category. Total expenditure- Rs. 2,815 crore.

3. **Increase limit of collateral free loan for SHGs** from current limit of Rs. 10 lakh to Rs. 20 lakh.

4. **MGNREGA wages increased from Rs.182 to Rs.202/–** w.e.f. 1st April 2020. MGNREGA allocation enhanced from Rs. 61,500 to Rs. 1, 01,500 crore through additional provision of Rs. 40,000 crore.

- **DEENDAYAL ANTYODAYA YOJANA NATIONAL RURAL LIVELIHOODS MISSION (DAY-NRLM)**

  - **SHG members as Covid warriors:** More than 2.87 lakh SHG members have come together to produce 17.70 crore facemasks; manufactured 4.16 lakh liters of sanitizer; 1.00 lakh liters of hand wash.

  - Over **6,491 community kitchens run by SHG members have served nearly 4.63 lakh persons on 19th June** (no. of persons served at community kitchens are for that one particular day).

  - **5300+ BC Sakhi conducted 43.02 lakh transactions amounting to Rs.799.13 Crore at door steps** of the rural poor.

  - Women Collectives Platform utilized for awareness generation - **Around 16.66 lakhs SHGs have involved in generation of awareness on COVID-19** and 2.35 Cr. community members have been oriented on preventive measures to be taken to combat COVID-19.

  - **Provision of dry ration:** Dry ration was provided to 34, 92,907 vulnerable households.

  - **Addressing migrants' problems through Vulnerability Reduction Fund:** The State Missions have been advised to utilise Vulnerability Reduction Fund (VRF) for helping rural poor through small grants and interest free loans.

- **MAHATMA GANDHI NATIONAL RURAL EMPLOYMENT GUARANTEE SCHEME (MGNREGS)**

  - **All the States/UTs been advised to provide job cards to willing job seekers including migrant labourers** and open jobs on demand following the health advisories issued from time to time.

  - **Advisory issued on Nutri-garden for further strengthening livelihoods and wage employments** of eligible rural poor.

  - The average number of persons to whom work has been offered in May 2020 so far is.

  - 2.51 crore per day, which is 73% higher than the average number of 1.45 crore person-days during the same period last year.

- **Works have been offered** (on 28 May 2020) **in 1.94 lakhs GPs.**
- **5.54 crore of wage seekers has been offered work** (till 28th May 2020).
- **A total of Rs. 31,545 crore has already been released to the States/UTs.**
- **Wage rate increased from Rs. 180 to Rs. 202/–** with effect from 1.4.2020.
- **60 crore person-days created till June 2020.**

9. Conclusion

Since independence the country has formulated various rural development programmes and has restructured and revamped them envisaging their wider outreach and acceptability. At present, rural people look up to the government for each and everything. This dependency syndrome needs to be dispelled. People's participation in the development sphere is crucial. People must be made fully aware of the opportunities available and how to take advantage of them. Government of India has announced Pradhan Mantri Awaas Yojana Gramin (PMAY-G) scheme is to provide houses, Pradhan Mantri Gram Sadak Yojana (PMGSY) to build roads and Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) to provide employment to rural people as well as Deendayal Antodaya Yojana National Rural Livelihood Mission (DAY-NRLM) aim to reduce poverty through promotion of diversified and gainful self employment and skilled wage employment opportunities resulting in appreciable increase in the incomes of rural poor on sustainable basis. These schemes are playing main role in rural development of India. The study reveals that the target number of houses to be constructed by the year 2021–2022, is 2.95 crore. The target set is to be achieved in phases and in the 1st phase 1 crore houses have been taken up for construction over a period of 3 years from 2016 to 2017 to 2018–2019. In the 2nd phase 1.95 crore houses are being taken up for construction over 3 years from 2019 to 2020 to 2021–2022. 35.27 lakh houses have been constructed during 2020–2021 under Pradhan Mantri Awaas Yojana (PMAY-G) scheme. The pace of construction of PMGSY roads a nine years high of 135 kms per day in 2018–2019 as against an average of 73 kms during the period 2011 to 2014. Hence, the pace of construction has increased by 93%. Under PMGSY about 6, 26,910 Km road length completed where as 41000 Km road length constructed by using green technology and 14312 Km road length constructed by using plastic waste. MGNREGA has provided employment to 6.9 crore households by generating more than 305.71 crore person days of wage employment covering 74.74 lakh works during financial year 2020–2021 and 5 crore works completed since inception. During COVID-19 pandemic, migrant workers were allowed to work under the scheme by being applying for job card. Approximately 1.44 crore Job Cards have been issued in FY 2020–2021. Total person-days generated in FY 2020–2021 have been 305.71 crore against approved LB for FY 2020–2021 of 333.09 crore. There has been 47% increase in persondays generated in comparison to FY 2019–2020. DAY-NRLM continued to show progress in all components during 2020–2021, the Mission has mobilised about 7.26 crore households into 66.03 lakh SHGs. Till December,2020 cumulatively total capitalization support of Rs 12195.13 crore was provided to the community institutions. Further SGHs have leveraged a loan of Rs. 3.47 Lakh crore from the banks since 2013–2014. Keeping the wheels of welfare activities running during the pandemic, Minsitry of Rural Development

geared up to combat COVID-19 with various special initiatives and measures for the well being of the rural population. The measures included from providing livelihood to the villages, production and distribution of masks and other essentials by the SHG women to rolling out communication campaigns for creating awareness about COVID-19 appropriate behaviour. Following are the welfare initiatives introduced through the schemes of rural development like Garib Kalyan Rojgar Abhiyaan, MGNREGA and DAY-NRLM etc. The need of the hour is the convergence of all development interventions at the grass-root level so as to enhance necessary infrastructure in the backward regions and ensure capacity building and skill up-gradation. Together with the government, the people living in rural area are also needed to contribute, without their contribution the development is not at all possible. Both have to take the initiative, this initiative will surely make our country developed country.

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Chapter 2

Poverty Reduction Strategies in Developing Countries

Collins Ayoo

Abstract

The existence of extreme poverty in several developing countries is a critical challenge that needs to be addressed urgently because of its adverse implications on human wellbeing. Its manifestations include lack of adequate food and nutrition, lack of access to adequate shelter, lack of access to safe drinking water, low literacy rates, high infant and maternal mortality, high rates of unemployment, and a feeling of vulnerability and disempowerement. Poverty reduction can be attained by stimulating economic growth to increase incomes and expand employment opportunities for the poor; undertaking economic and institutional reforms to enhance efficiency and improve the utilization of resources; prioritizing the basic needs of the poor in national development policies; promoting microfinance programs to remove constraints to innovation, entrepreneurship, and small scale business; developing and improving marketing systems to improve production; providing incentives to the private sector; and, implementing affirmative actions such as targeted cash transfers to ensure that the social and economic benefits of poverty reduction initiatives reach the demographics that might otherwise be excluded.

Keywords: poverty, poverty reduction, inclusive economic growth

1. Introduction

Poverty is a serious economic and social problem that afflicts a large proportion of the world's population and manifests itself in diverse forms such as lack of income and productive assets to ensure sustainable livelihoods, chronic hunger and malnutrition, homelessness, lack of durable goods, disease, lack of access to clean water, lack of education, low life expectancy, social exclusion and discrimination, high levels of unemployment, high rate of infant and maternal mortality, and lack of participation in decision making [1–3]. Because poverty has deleterious impacts on human wellbeing, its eradication has been identified as an ethical, social, political and economic imperative of humankind [1, 3, 4]. Thus, the eradication of poverty and hunger were key targets in the Millennium Development Goals that the United Nations adopted in September 2000, and continue to be a priority in the pursuit of the Sustainable Development Goals that the United Nations General Assembly subsequently adopted in January 1, 2016 [5–9]. Although poverty exists in all countries, extreme poverty is more widespread in the countries in Sub-Saharan Africa and South Asia [8, 10]. The causes of poverty in these countries are complex and include the pursuit of economic policies that exclude the poor and are biased against them; lack of access to markets and meaningful income-earning opportunities; inadequate public support for microenterprises through initiatives such as low interest credit and skills training; lack

of infrastructure; widespread use of obsolete technologies in agriculture; exploitation of poor communities by political elites; inadequate financing of pro-poor programs; low human capital; conflicts and social strife; lack of access to productive resources such as land and capital; fiscal trap; and governance failures. Liu et al. [11], Beegle and Christiaensen [12], and Bapna [13] note that although considerable progress has been made to reduce poverty in the last two decades, more needs to be done to not only reduce the rate of extreme poverty further, but to also reduce the number of those living under extreme poverty. This is an important aspect of poverty reduction given that the rate of poverty can fall while the number of the poor is increasing simultaneously. For example, the poverty rate in Africa decreased from 54% in 1990 to 41% in 2015 but the number of the poor increased from 278 million in 1990 to 413 million in 2015. This constitutes a compelling case for robust well-thought out policies that not only stimulate economic growth but also produce outcomes that are inclusive and sustainable and address other dimensions of well-being such as education, health and gender equality [1, 8, 12, 14–20]. Examples of poverty reduction initiatives that various countries have adopted are Ghana's poverty reduction strategy, Ethiopia's sustainable development and poverty reduction program, Kenya's economic recovery strategy for wealth and employment creation, Senegal's poverty reduction strategy, and Uganda's poverty eradication action plan. Toye [21] notes that the measures outlined in these strategic policy documents have not been effective in reducing poverty because they were initiated as a condition for development assistance under the debt relief initiative of the International Monetary Fund and the World Bank. A critical analysis of the poverty reduction measures contained in these documents, however, reveals that to a large extent their failure to significantly reduce the incidence of poverty can be largely attributed to factors such as how the programs were designed, how the poverty reduction policies were targeted, and how they were implemented. This chapter is based on the premise that success in poverty reduction can be achieved by identifying who the poor are, assessing the extent of poverty in the different regions of developing countries, determining both the root causes of poverty and the opportunities that exist for reducing the incidences of poverty and improving the standards of living, and removing the various obstacles to poverty reduction [1, 3, 6, 15, 22]. The assumption that economic growth automatically results in a reduction of poverty also needs to be re-examined given the existence of empirical evidence that shows that economic growth can occur while poverty is worsening [8, 16, 17, 23–27]. The focus needs to be on inclusive growth that addresses the unique needs of the poor and increases their access to basic services, employment and income generating opportunities, reliable markets for their products, information, capital and finance, and adequate social protections that remove the causes of the vulnerability of the poor [3, 7, 14, 19, 25, 28–31]. The experience of diverse rapidly growing developing countries demonstrates that with political will and visionary leadership that is committed to justice, equality, and rule of law, the goal of reducing poverty and improving the living standards of the poor is achievable. Sachs [4] notes that through such leadership the downward spiral of impoverishment, hunger, and disease that certain parts of the world are caught in can be reversed and the massive suffering of the poor brought to an end. Sachs is categorical that although markets can be powerful engines of economic development, they can bypass large parts of the world and leave them impoverished and suffering without respite. He advocates that the role of markets be supplemented with collective action through effective government provision of health, education and infrastructure. The World Bank [1, 32, 33], Acemoglu and Robinson [34], and Beegle and Christiaensen [12] argue that in much of Sub-Saharan Africa where agriculture is the main occupation, low agricultural productivity is a primary cause of poverty. They assert that the low agricultural productivity is a consequence of the ownership structure of the land and the incentives that are created for

farmers by the governments and the institutions under which they live. More recently, the COVID-19 global pandemic has significantly increased the number of the newly poor. The World Bank [16] estimates that in 2020, between 88 million and 115 million people fell into extreme poverty as a result of the pandemic and that in 2021 an additional between 23 million and 35 million people will fall in poverty bringing the new people living in extreme poverty to between 110 million and 150 million. But the World Bank also points out that even before the pandemic, development for many people in the world's poorest countries was too slow to raise their incomes, enhance living standards, or narrow inequality. Coates [35] contends that in February 2020, poverty was in fact increasing in several countries while many others were already off track to achieving Sustainable Development Goal 1. In what follows, I explore these issues and identify practical measures that can be applied to stimulate inclusive growth and reduce extreme poverty in developing countries. I also present some case studies to demonstrate how these measures have been successfully applied in various developing countries.

2. Some definitions and statistics

A clear definition of poverty is vital to identifying the causes of poverty, measuring its extent, and in assessing progress towards its eradication. The World Bank defines poverty in terms of poverty lines that are based on estimates of the cost of goods and services needed to meet the basic subsistence needs. Thus, the poor are regarded as those whose incomes is at or below specific poverty lines. The most commonly used international poverty line is $1.90 per day [5, 17]. A concept that is closely related to the poverty line is the head count index which is the proportion of the population below the poverty line. **Table 1** shows that Sub-Saharan Africa made significant progress in poverty reduction between 1990 and 2018 as indicated by the decrease in the head count index from 55–40%. Over this period, the population of Sub-Saharan Africa increased by 112% from 509.45 million to 1078.31 million and the population of the poor increased by 55% from 280.95 million to 435.56 million. This increase in the number of the poor by about 154.61 million is significant and suggests an urgent need to intensify poverty reduction efforts.

The rate of poverty in Sub-Saharan Africa is significantly greater if it is assessed using a $3.20 a day poverty line. Several researchers argue that $3.20 a day is a more

	Poverty line of US$ 1.90		**Poverty line of US$ 3.20**	
	Head count index	**Number of the poor**	**Head count index**	**Number of the poor**
1990	0.55	280.95	0.76	385.50
1995	0.60	352.76	0.79	463.37
2000	0.58	388.27	0.79	526.33
2005	0.52	393.57	0.76	574.25
2010	0.47	412.49	0.72	626.12
2015	0.42	417.60	0.68	679.09
2018	0.40	435.56	0.67	718.76

Source: PovCalNet, World Bank.Online.

Table 1.
Head count index (%) and the number of the poor (millions) in sub-Saharan Africa.

realistic yardstick for assessing poverty and are critical of the commonly used $1.90 a day poverty line that they regard as being too low for standard of living assessments. As expected, **Table 1** shows that over the period under consideration the poverty rates in Sub-Saharan Africa were higher using a $3.20 a day poverty line as compared to poverty rates estimated using a $1.90 a day poverty line. Specifically, using the $3.20 a day poverty line shows that the poverty rates were 76% in 1990 and declined to 67% in 2018. However, over 1990–2018 period, the number of those living in poverty increased by 333.26 million from 385.5 million to 718.76 million (**Figures 1–3**).

A useful metric in analyzing poverty issues is the poverty gap which is the ratio by which the mean income of the poor fall below the poverty line. The poverty gap is an indicator of the severity of the poverty problem in any context and provides an estimate of the income that is needed to bring the poor out of poverty. The squared poverty gap is also an indicator of the severity of poverty and is computed as the mean of the squared distances below the poverty line as a proportion of the poverty a line. Its usefulness stems from the fact that it gives greater weight to those who fall far below the poverty line than those who are close to it. Estimates of the squared poverty gap can be used to more effectively target poverty alleviation policies to

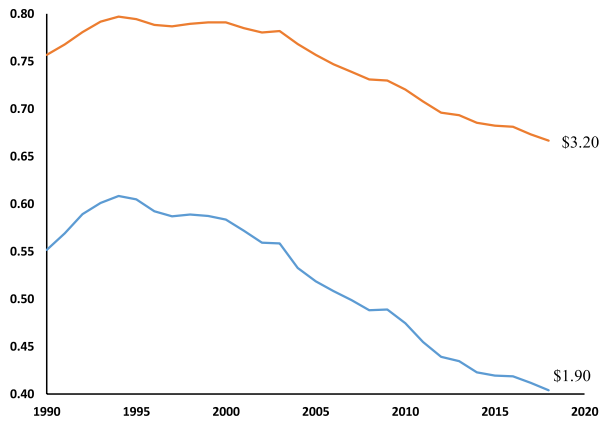

Figure 1.
Headcount index (%) sub-Saharan Africa. Source: PovCalNet [36], World Bank. Online.

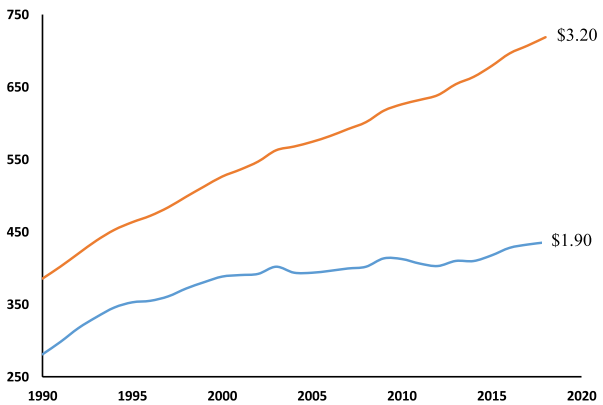

Figure 2.
Number of the poor (millions) in sub-Saharan Africa. Source: PovCalNet [36], World Bank. Online.

segments of communities that are more severely impacted by poverty and thus bring about better and more equitable outcomes. Some values of the squared poverty gaps for Sub-Saharan Africa are presented in **Table 1** and depicted in **Figure 4**.

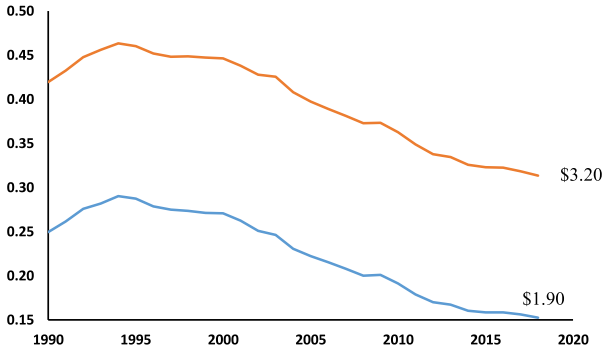

Figure 3.
Poverty gap in sub-Saharan Africa. Source: PovCalNet [36], World Bank. Online.

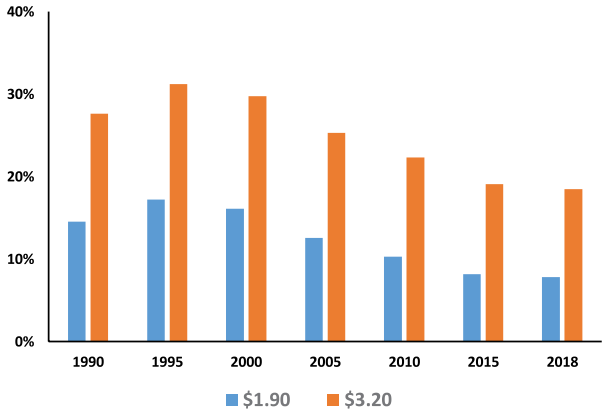

Figure 4.
Squared poverty gap in sub-Saharan Africa. Source: PovCalNet [36], World Bank. Online.

	Pov. Gap ($1.90)	Sq. Pov. Gap ($1.90)	Pov. Gap ($3.20)	Sq. Pov. Gap ($3.20)
1990	0.25	0.15	0.42	0.28
1995	0.29	0.17	0.46	0.31
2000	0.27	0.16	0.45	0.30
2005	0.22	0.13	0.40	0.25
2010	0.19	0.10	0.36	0.22
2015	0.16	0.08	0.32	0.19
2018	0.15	0.08	0.31	0.18

Source: PovCalNet [36], World Bank.Online.

Table 2.
Poverty gap and squared poverty gap (%) in sub-Saharan Africa.

They corroborate the overall picture of the severity of poverty declining in sub-Saharan Africa between 1990 and 2018 (**Table 2**).

3. Poverty alleviation strategies

Poverty is a challenge that developing countries can overcome through, among others, good economic and social policies, innovative and efficient use of resources, investments in technological advancement, good governance, and visionary leadership with the political will to prioritize the needs of the poor. Sachs [4] notes that these elements are vital in enabling the provision of schools, clinics, roads, electricity, soil nutrients, and clean drinking water that are basic not only for a life of dignity and health, but also for economic productivity. In several countries measures are already being implemented to combat extreme poverty and improve the standards of living of the impoverished communities with steady progress being realized in several cases. Policy makers can learn important lessons from these poverty reduction measures and replicate and scale them up in other regions. Some strategies that developing countries can apply to reduce both the rate of poverty and number of the poor are:

3.1 Stimulating inclusive economic growth

Economic growth is vital in enabling impoverished communities to utilize their resources to increase both their output and incomes and thus break the poverty trap and be able to provide for their basic needs [1, 4, 19, 20, 22, 23, 25, 37, 38]. However, for economic growth to be effective in reducing poverty, it needs to be both inclusive and to occur at a rate that is higher than the rate of population growth. The fact that agriculture is the dominant economic sector in most poor communities implies that efforts to combat extreme poverty need to be directed towards increasing agricultural production and productivity [28, 30, 39–42]. Some concrete ways for achieving this overall goal include promoting the adoption of high yielding crop varieties and use of complementary inputs such as fertilizers and pesticides; intensifying the use of land through technological improvements such as increased use of irrigation where water is a constraint to agricultural production; and, adoption of post-harvesting measures that reduce the loss of agricultural produce. These measures are costly and are likely to be unaffordable to poor households. Their increased adoption requires the provision of cheap credit on terms that are flexible and aligned to the unique circumstances of the poor. How credit programs are designed is critical because it can have a significant impact on poverty reduction and livelihood outcomes [35, 43]. When well designed, these programs can stimulate economic growth and enable poor communities to access financial capital for investment in income-generating activities. If poorly designed (e.g. if the interest rates are high and the repayment periods are short), credit programs can be not only exclusionary and inequitable, but the credit can also be misapplied, the poor entrapped in debt cycles, and economic growth and poverty reduction undermined.

Stimulating economic growth also requires public investments in infrastructure such as roads, electrical power, schools, hospitals, and water and sanitation systems [23]. These investments are important for several reasons. Good roads reduce transportation costs and generate diverse economic benefits that include increased ease of transporting agricultural produce to markets, ease of accessing agricultural inputs, and an increase in the profitability of income-generating businesses [23]. Providing electric power to impoverished areas not only results in improved standards of living but also stimulates the establishment of small-scale industries that process agricultural produce and thus contribute to value addition, in addition

to creating much needed jobs. Providing safe, good-quality water for drinking and domestic use is vital in reducing incidences of debilitating water-borne diseases that are expensive to treat, saving time used to fetch water and enable the time and effort saved to be employed in more productive activities. More generally, investment in infrastructure will make rural economies more productive, increase household incomes, contribute to meeting basic needs, and enable greater saving for the future thus putting the economy on a path of sustainable growth [4, 35, 40].

A key challenge that developing countries face in providing the infrastructure they need is financing. On this issue several researchers advocate for increased use of foreign aid to finance public infrastructure in poor developing countries. According to Sachs [4], the rationale for this policy proposal is that developing countries are too poor and lack the financial resources for providing the infrastructure that they require to break the poverty trap and enable the provision of basic needs. He argues that if the rich world had committed $195 billion in foreign aid per year between 2005 and 2025, poverty could have been entirely eliminated by the end of this period. Moyo [44], Easterly [45, 46], and Easterly and Levine [47] are however critical of foreign aid and assert that it not only undermines the ability of poor communities to develop solutions to their problems but also fosters corruption in governments and results in the utilization of the aid funds on non-priority areas. Banerjee and Duflo [43] and Page and Pande [23] opine that foreign aid can foster economic growth if well-targeted and used efficiently. They however point out that in most cases foreign aid is a small fraction of the overall financing that is required and that developing countries must increasingly rely on their own resources that are generated through taxes. Successful financing of critical infrastructure and social services will therefore require more efficient expenditures of public resources and the eradication of corruption in governments.

3.2 Economic and institutional reforms

An important step in reducing poverty in developing countries is the implementation of economic and institutional reforms to create conditions that attract investment, enhance competitiveness, ensure increased efficiency in the use of resources, stimulate economic growth, and create jobs. If well designed and implemented, these reforms can be instrumental in strengthening governance and reducing endemic corruption and poor accountability that have contributed to the poor economic performance of several developing countries [23, 27]. Some reforms that are needed include the strengthening of land tenure systems to encourage risk-taking and investment in productive income-generating activities; improving governance to ensure greater inclusivity, transparency and accountability; reducing the misuse of public resources and unproductive expenditures; ensuring a greater focus on the needs and priorities of the poor; maintaining macroeconomic stability and addressing structural constraints to accelerating growth e.g. by reducing the high costs of doing business and excessive regulatory burdens; and involving the poor, women, and the youth in decision-making [8]. These reforms can benefit the poor by improving their access to land and other productive resources and by ensuring that their needs and priorities are adequately considered in policy making. Developing countries also need to reform their tax systems to make them more efficient and pro-poor.

3.3 Promoting microfinance institutions and programs

Lack of finance is a major constraint to the establishment of small scale businesses and other income generating activities in impoverished communities in several developing countries [48, 49]. Through microfinance institutions, this

constraint can be removed and the much-needed credit provided to small businesses that are often unable to access credit from formal financial institutions. In this way, micro-credit can be instrumental in stimulating economic activity, creating jobs in the informal sector, increasing household incomes, and reducing poverty [1, 3, 28, 43, 48, 50–52]. Vatta [53] has noted that microfinance institutions have good potential to reach the rural poor and to address the basic issues of rural development where formal financial institutions have not been able to make a significant impact. Some advantages of obtaining credit from microfinance institutions include less stringent conditions with regard to providing collateral thus easing access to credit; the possibility of the poor obtaining small amounts of loans more frequently thus enabling the credit needs for diverse purposes and at shorter time intervals to be met; reduced transaction costs; flexibility of loan repayment; and an overall improvement in loan repayment. The small informal self-help groups that are often the units for microcredit lending are also valuable for social empowerment and fostering learning, the development of skills, entrepreneurship, exchange of ideas and experiences, and greater accountability by the group members [49, 54]. Sachs [4] supports microfinance as a viable and promising path to poverty alleviation and cites Bangladesh as a country where micro-credit has contributed to a reduction in poverty through group lending that enabled impoverished women who were previously considered unbankable and not credit worthy to obtain small loans as working capital for microbusiness activities. He further notes that by opening to poor rural women improved economic opportunites, micro-credit can be instrumental in reducing fertility rates and thus improve the abilities of households to save and provide better health and education for their children.

3.4 Improving the marketing systems

According to Karnani [55], the best way to reduce poverty is to raise the productive capacity of the poor. Efficient marketing systems are vital in enabling the poor to increase their production because they permit the delivery of products to markets at competitive prices that result in increased incomes. This is also the reason why developing countries need to explore ways of expanding export markets. The plight of cotton, rice, tea, coffee, and cashew nut farmers in Kenya demonstrates the importance of improving the marketing systems. Weaknesses and inefficiencies in the marketing of these commodities has resulted in the impoverishment of the farmers who face problems such as damage to their harvests, low commodity prices and thus low profits and incomes, and exploitation by middlemen. By improving the marketing system, the growers of these commodities can benefit from better storage that would cushion them from price fluctuations, the pooling of their resources that would enable a reduction of their costs, and the processing of their products to enable value-addition and an improvement on the returns. The implementation of these measures can stimulate local, regional, and national economies; underpin the establishment of a robust agro-industrial sector; create jobs; increase production and incomes; and, contribute to equitable and sustained reduction of poverty.

3.5 Cash/income transfer programs

The fight against poverty needs to consider the fact that among the poor are those who cannot actively participate in routine economic activities and are therefore likely to suffer exclusion from the benefits of economic growth. This category of the poor include the old and infirm, the sick and those afflicted by various debilitating conditions, families with young children, and those who have been displaced by war and domestic violence. Special affirmative actions that transfer

incomes to these groups are required to provide for their basic needs and ensure more equity in poverty reduction. In impoverished regions where children contribute to the livelihoods of their families by supplying agricultural labor and participating in informal businesses, income transfer programs can provide families with financial relief and enable regular school attendance by children. Such investment in the education of the children is vital in improving their human capital and prospects for employment and can therefore play an important role in long term poverty reduction [7, 8, 56]. Kumara and Pfau [57] analyzed such programs in Sri Lanka and found that cash transfers in the country significantly reduced child poverty and also increased school attendance and child welfare. Barrientos and Dejong [58], Monchuk [59], Banerjee et al. [60], Page and Pande [23], Hanna and Olken [61], and World Bank [8] strongly support cash transfer programs and contend that these programs are a key instrument in reducing poverty, deprivation, and vulnerability among children and their households. They cite South Africa, Bangladesh, Brazil, Mexico and Chile as examples of countries where cash transfer programs have significantly reduced poverty and vulnerability among poor households. They also point out that cash transfer programs are beneficial to households because they are flexible and enhance the welfare of households given that households are free to use the supplemental income on their priorities.

Cash transfer programs are central to social protection that is much needed in developing countries that face heightened social and economic risks due to structural adjustments driven by globalization. As noted by Sneyd [2], Monchuk [59], Barrientos et al. [62], and Barrientos and Dejong [58], globalization has resulted in greater openness of developing economies and exposed them to changes in global markets leading to a greater concentration of social risk among vulnerable groups. They regard social protection as the most appropriate framework for addressing rising poverty and vulnerability in the conditions that prevail in developing countries. They recommend that if significant and sustained reduction in poverty is to be achieved, cash transfer programs be accompanied by complementary actions that extend economic opportunities and address the multiple dimensions of poverty such as food, water, sanitation, health, shelter, education and access to services. Fiszbein et al. [29] strongly support the increased use of social protection programs such as cash transfers to alleviate extreme povery and estimate that in 2014 these programs prevented about 150 million people from falling into poverty. It needs to be noted that although well designed cash transfer programs can be effective in reducing poverty, they are expensive and may be difficult to finance in a sustained manner [23]. However, by reducing wasteful expenditures and instituting tax reforms, the required resources can be freed for investment in cash transfer programs [29]. The viability of this approach is evident in the case of Bangladesh and a number of central Asian countries that have been able to successfully finance cash transfers from their national budgets. Countries that are not able to finance cash transfer programs from their own resources need to explore the possibilities of securing medium-term support from international organizations [4, 7, 29, 58, 63].

A major concern that several researchers have expressed regarding cash transfer programs is that they have a short term focus of alleviating only current poverty and have thus failed to generate sustained decrease in poverty independent of the transfer themselves. Critics of cash transfers also argue that they are a very cost ineffective approach to poverty alleviation and an unnecessary waste of scarce public resources. Furthermore, they claim that many cash transfer programes are characterized by unnecessary bureaucracy, high administrative costs, corruption, high operational inefficiencies, waste, and poor targeting. The overall result of these weaknesses is that program benefits have to a large extent failed to reach the poorest households. Where these shortcomings exist, they need to be identified

through rigorous audits and addressed through improved program design. But more fundamentally, it also needs to be recognized that cash transfer programs are not simply handouts but are investments in poor households that regard the programs as their only hope for a life free from chronic poverty, malnutrition and disease.

4. Selected case studies on poverty reduction in developing countries

The goal of poverty reduction can be achieved through sound policies that address the root causes of poverty, promote inclusive economic growth, prioritize the basic needs of the poor, and provide economic opportunities that empower the poor and enable them to improve their standards of living [6, 8, 64]. In what follows we present a few case studies from sub-Saharan Africa, Asia and Latin America to illustrate real world examples of policies that have resulted in significant reduction in poverty. Policy makers can learn important lessons from these case studies in their attempts to combat poverty in different contexts.

4.1 Sub-Saharan Africa

Several countries in Sub-Saharan Africa have developed poverty reduction plans that are currently being implemented to improve the standards of living of the poor and vulnerable. In Kenya where poverty is widespread and is estimated to exceeed 60 percent, the key elements of the poverty reduction strategy are facilitating sustained and rapid economic growth; increasing the ability of the poor to raise their incomes; improving the quality of life of the poor; improving equity and the participation of the poor in decision-making and in the economy; and improving governance and security [65]. The government has also implemented macroeconomic reforms to reduce domestic debt burden and high interest rates - this is expected to promote higher private-sector led growth and thus contribute to poverty reduction. An important action that is being carried out to reduce poverty in Kenya is promoting agricultural production. This focus is underpinned by the fact that the majority of Kenyans derive their livelihoods and income from agriculture and live in rural areas. Some specific poverty reduction measures in Kenya that target the agricultural sector include providing subsidized fertilizers and seeds; encouraging the growing of high value crops; rehabilitation and expansion of irrigation projects; and, provision of subsidized credit to alleviate capital contraints. To support agricultural production, the government has also prioritized the strengthening and streamling of the marketing system and the expansion of rural roads to improve the access of the poor to markets, increase economic opportunities, and create employment. Robust efforts are also underway to increase agricultural exports as a means for stimulating domestic agricultural production and increasing the country's foreign exchange earnings. Other poverty reduction measures that are being implemented in Kenya are the promotion of small scale income generating enterprises; subsidization of education and health care to reduce the costs to poor households; school-feeding programs; rural employment schemes through public works projects; investments in technical and vocational training to enable the youth acquire skills in areas such as carpentry, masonry, and, auto mechanics; and, family planning programs to reduce the fertility rates.

In collaboration with international development partners, Kenya and other low and middle income countries in Sub-Saharan Africa have been implementing cash transfer programs on a limited scale to address extreme poverty and assist vulnerable households. The cash transfers were unconditional in the intial phases with disbursements made to all applicants. Subsequently however, and based on the

lessons learned from the earlier phases, several countries have redesigned their cash transfer programs and made them conditional and contingent on means-testing. This is important given the severe budget contraints that developing countries face, the need to target the cash transfers on the poorest and most vulnerable households, and the need to ensure that social protection expenditures are efficient and result in the greatest reduction in poverty. Egger et al. [66] conducted an empirical study of a cash transfer program in rural western Kenya between mid-2014 and early 2017 and concluded that the program had several positive effects on both the households that received the cash transfers and those that did not. Some specific benefits attributable to the cash transfer program were an increase in consumption expenditures and holdings of durable assets by households; increased demand-driven earnings by local enterprises; increased food security; improved child growth and school attendance; improvement in health of members of the recipient households; female empowerment; and, enhanced psychological well-being. Furthermore, the cash transfer program had a stimulatory effect on local economic activities and these effects persisted long after the cash disbursements. The experience with cash transfer programs demonstrates that they can contribute significantly to a reduction in extreme poverty if they are scaled up, and if they are well designed and targeted at the poorest households.

Since March of 2020, Kenya's progress in poverty reduction has been adversely affected by the COVID-19 pandemic that is estimated to have increased the number of the poor by an additional 2 million through adverse impacts on incomes and jobs [24, 67]. The containment measures that were implemented in response to the pandemic significantly slowed economic activity, reduced revenues from household-run businesses, exacerbated food insecurity, and posed a serious threat to the lives and livelihoods of large segments of the population. Some of the actions that the government of Kenya took to address these challenges included allocating more resources to the healthcare sector to combat the pandemic; instituting taxation and spending measures to support healthy firms from permanent closure in order to protect jobs, incomes and the productive capacity of the economy; and, scaling-up social protection programs to offset the increase in poverty and protect the most vulnerable households [24, 67].

4.2 Asia

A number of countries in Asia have developed and implemented programs that have been impactful in significantly reducing extreme poverty. According to the Asian Development Bank (ADB) [68], these programs were predicated on rapid economic growth driven by innovation, structural reform, and the application of private sector solutions in the public sector. Asia's progress in raising prosperity and reducing poverty is evident from the fact that since 1990 over a billion people have emerged from extreme poverty and also from the fact that in the decade spanning 2005–2015 more that 611 million people were lifted out of extreme poverty – four-fifths of these were in China (234 million) and India (253 million) [68]. The general approach that governments of Asia have taken to poverty reduction include accelerating economic growth, increasing the delivery of social services, developing lagging areas, increasing investments to generate jobs, promoting small and medium-sized enterprises, redistributing incomes, balancing rural–urban growth, and developing social protection interventions [68, 69].

An example of a successful poverty reduction initiative in Asia is the Shanxi Integrated Agricultural Development Project (SIADP) that was implemented between 2009 and 2016 in the Shanxi province in China with a $ 100 million loan from the ADB. The goal of the SIADP was to improve agricultural production in the

region as a way to stimulate economic growth and reduce the level of poverty. Prior to the implementation of the SIADP most farmers in Shanxi province mainly grew wheat and corn that generated low incomes and required extensive use of water and agrochemicals. The farmers in the region also engaged in free-range livestock grazing, an environmentally unsustainable practice that resulted in soil and water pollution from uncontrolled disposal of untreated animal waste. They were also unorganized and did not have good access to markets and finance, and the participation of women in the economy was marginal and their social and economic rights ignored. According to the ADB [68], the SIADP was implemented by first training farmers in improved production techniques that resulted in the development of a sustainable agricultural sector with the farmers starting to grow high-value crops, and forming contract farming agreements with agro-enterprises that enabled the farmers to gain access to stable markets and premium prices for their produce. The farmers also started breeding and raising livestock under more controlled conditions that enabled not only an increase in livestock output but also the turning of animal waste into compost or biogas which is a source of clean energy. These measures were instrumental in stimulating the region's bioeconomy, improving the quality of the environment, increasing farm incomes, and reducing the level of poverty in Shanxi province.

Social protection programs are vital in cushioning poor and vulnerable households from crises they are unable to cope with and that are likely to cause an overall reduction and degradation of their physical and social assets [68]. This is exemplified by the food stamp program that was implemented in 2008 through a partnership between the Government of Mongolia and the ADB. The food stamp program was put in place at a time when the overall poverty rate in Mongolia was 32.6 percent of the population with about 5 percent of the population being categorized as extremely poor. There was also a high level of food insecurity in the country and a high inflation rate that had reached 32.2 percent [68]. To help reduce the adverse impact of food insecurity and high inflation, the government of Mongolia established a food subsidy program that targeted poor households. The program was very effective in assisting the poor to buy enough floor, rice and other basic commodities and also freed up money that the poor could then spend on other necessities. Following the introduction of this program, school attendance by children increased and their mean grades improved [68]. The program also supported the poor households in developing alternative food sources. The ADB [68] notes that the participants in the food stamp program also learned valuable skills in backyard gardening, food storage and food preservation with many of them reporting significant earnings from vegetable production. Thus, the program contributed directly to poverty reduction by mitigating the adverse effects of the food and financial crises on the poor and is a strategy that developing countries need to seriously consider in their efforts to reduce povery and improve living standards.

4.3 Latin America

As a region, Latin America has performed reasonably well in reducing extreme poverty and boosting shared prosperity [70]. A country-specific assessment however reveals a significant heterogeneity across and within the countries in the region. The countries that have performed well include Argentina, Bolivia, Brazil, Panama, Uruguay, and Peru while those that have performed poorly include Guatemala, Mexico, Honduras, Nicaragua and the Dominican Republic. For the well-performing countries, the reasons include rapid and inclusive economic growth, and the adoption of redistributive policies such as improved access to education, healthcare, and social protections. In these countries, there has been a significant increase in the

participation of the poor in labor markets thus enhancing their ability to generate labor income. Cord et al. [70] assert that the growth in female labor force participation in particular has been strong and has contributed to the substantial drop in poverty rates that has been observed in the well-performing countries. It is worth noting that these gains in poverty reduction and promotion of shared prosperity have been aided by prudent macro fiscal economic policies and positive terms of trade. These countries have also benefitted immensely from remittance flows that have not only complemented the expansion of government transfers and the broadening of pension coverage but have also enabled greater macroeconomic stability, higher savings, more entrepreneurship and better access to healthcare and education. In a country like El Salvador which is one of the largest remittance-receiving countries in the region, these private remittances have played a major role in poverty reduction [70]. Although, the income transfer programs that several countries in Latin America have implemented have been effective in reducing persistent intergenerational poverty, the incidence of poverty in the region has remained high due, in part, to the limited scale of these programs and weaknesses in their design [71]. By supplementing household consumption, these programs are playing a key role in human development and preventing future poverty because present consumption improves productive capacity through the expected positive impact of improved nutrition and health status on labour productivity [71]. Further reduction in poverty in the region requires not only the scaling up of the income transfer programs and improvements in their design to ensure greater efficiency in service delivery, but also the redressing of other critical drivers of poverty such as the long-standing inequalities in access to land and other productive resources [71]. A problematic issue that needs to be addressed is the over-reliance of these programs on external financing; it poses to policy-makers the challenge of identifying and crafting alternative sources of financing to ensure the sustainability of these programs.

5. Conclusions and policy implications

Poverty is a serious challenge that developing countries are facing today and requires focused and sustained action to significantly reduce it, break the cycle of poverty, and improve the standards of living. Although income is the yardstick that is most commonly used to measure and assess it, poverty is multidimensional and entails diverse aspects of well-being that include food, water, sanitation, health, shelter, education, access to services and human rights [20]. According to the World Bank, the extent of poverty is highest in Sub Saharan Africa, South Asia, and Latin America where the number of the poor has been increasing due to high population growth and modest economic performance in these regions. Various reports also indicate that the youth are the majority of the population in these countries so that targeting them can be effective in reducing poverty. Developing countries are currently in various stages implementing policies aimed at reducing poverty and vulnerability, and improving the standards of living. Promoting inclusive economic growth is vital not only in increasing output and incomes but also in ensuring that the benefits of economic growth are broadly shared. Some ways of promoting inclusive economic growth are investing in infrastructure and technology; liberalizing trade and expanding export markets; providing incentives to small and medium businesses; providing fiscal stimulus to the economy; ensuring macroeconomic stability; and improving public management and governance [8, 26, 33]. The implementation of these measures in an integrated manner can have positive economy wide effects, incentivize the private sector, create the much needed employment opportunities, and reduce the levels of poverty.

Poverty reduction can also be enhanced through microfinance institutions that not only provide credit to small borrowers who are often unable to access credit from formal financial institutions, but also mobilize domestic savings and channel these savings towards income generating activities [43]. This role of microfinance institutions is particularly important in developing countries where most businesses are small scale and face severe financing constraints [43, 48, 51, 52]. The available empirical evidence demonstrates that microfinance has been instrumental in supporting income generating activities in impoverished regions and thus contributed to the provision of basic needs and reduction of poverty. Developing countries can also address the challenge of poverty by improving the efficiency and competitiveness of their economies. This can be accomplished through economic and institutional reforms that reduce the cost of doing business, strengthen the linkages between various sectors of the economy, protect property rights, reduce corruption, and foster greater accountability in public management. Tax regimes also need to be reformed to make them more efficient, provide incentives to small businesses, effect redistribution in favor of the poor, and generate more resources that can be used to finance critical services such as education, health, water and sanitation, and shelter for the poor. Furthermore, through tax reforms employment opportunities can be expanded as a key step in poverty reduction. Finally, carefully designed affirmative actions and social protection programs need to be included as a key pillar of the poverty reduction strategies of developing countries given that there will invariably be groups in society whose unique circumstances result in their exclusion from the economic and social benefits of conventional poverty reduction measures. This is the rationale for the cash transfer programs that several developing countries are increasingly implementing to reduce poverty and vulnerability. The private sector and international development institutions can play an important role in poverty reduction in developing countries by providing expertise and the supplemental resources and assistance that are needed to implement poverty reduction plans. Success in poverty eradication requires a focus on areas where poverty is widespread and the use of innovative and practical policy instruments that are most likely to lift the greatest number of the poor out of poverty. It is a goal that is attainable through collaboration among all stakeholders, prioritization of the basic needs of the poor, the determination to improve economic performance to realize inclusive economic growth and break the vicious cycle of povery, empowering the poor to take control of their future, and by mainstreaming poverty reduction into national policies and actions.

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Chapter 3

Rural Development System in Nigeria and the Veering Locus from China's Successful Strategies

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Abstract

Development of the rural areas calls for the provision of basic infrastructure and social amenities with a view to enhancing the quality of life in the environments. Attainment of rural development, however, depends on pragmatic and conscientious planning, and the political-will to have the development plans was effectively implemented. The essentiality of these actions is highly reflected in the revolutionary transformation of China's rural system, with the resultant rapid economic growth and poverty reduction in the country, put at 8–9% per annum. Nigeria though had transformation-oriented rural development programs that are similar to those of China, none of the programs had visible or sustainable impacts in the country's rural life. A critical analysis of the causal failure of Nigeria's rural development programs in relation to the recorded successes in China shows that implementations of Nigeria's rural development programs veered from the locus of the political-will that forms the strength of the recorded successes by China. Rethinking the paradigm of rural development in Nigeria unequivocally calls for modeling the country's rural program implementations alongside the strength of the political-will adopted by China for attainment of the much desired rural transformation and sustainable development in Nigeria.

Keywords: rural life situation in China and Nigeria, pro-rural development policies, political-will for policy implementation, impact of rural programs, veering locus in Nigeria

1. Introduction

Rural areas remain a dominant landscape in most countries, given that the general populace heavily depends on the areas for food and economic development (International Fund for Agricultural Development [1]). Improved productivity and quality of living by rural residents, however dependent on the social supports available to them in persons and/or to their environment [2]. Unfortunately, rural areas, especially in developing countries, have not been given the desired social support for quality living and transformational development. Much of the infrastructure for the national development agenda and service provisions have largely been concentrated in the urban areas leading to an imbalance in the development drive between the two areas [3, 4]. The resultant effects of this include the poor living condition

of the rural areas, and the drive for rural-urban migration as an option of a social safety net [5, 6]. Such migration has in turn brought about congestion of the urban areas with heavy pressure on the available infrastructure and social amenities in the areas [7–9]. The need to avert this situation puts the drive for rural development in the forefront of national development across the globe. Rural development drive is more essential to sub-Saharan Africa, where life in the areas is highly demeaning due to little or no social supports for the rural areas and the residents.

Rural development construes a distinct approach to improving the living condition or fostering the socio-economic change in rural areas [10, 11]. It usually entails the creation of enabling environment such that residents of the areas could explore the environment for satisfaction of their basic needs of life, improve their economies and quality of life [12]. The bedrock to achieving this is the provision of functional infrastructure and social amenities like good roads, electric power supply, telecommunication network, pipe born water, and institutional support services for enhanced productivity and improved living conditions [13, 14]. Attainment of this fit however depends on putting the right policies and institutes in place at both the national and international levels. Without this, the globalization drives and its attendant mutual benefits would not only bypass the poor countries but would as well harm their social and economic development [15]. Consequently, development practitioners, either as governmental or non-governmental organizations at national and international levels, have begun working at formulating and implementing pro-rural policies that would not just bring about transformational development of the rural systems but have rural lives integrated in the globalization drive. A number of countries, with similar economic status with Nigeria many decades ago, particularly the Asian and Pacific countries, had conscientiously embarked on agricultural development programs, before the turn of the twenty-first century, as an approach to developing their rural system [16–20].

2. Rural development approaches in Nigeria and China: the agricultural dimension

In view of the fact that agriculture constitutes the dominant economic base of the rural areas, rural development schemes and programs have been designed around the development of agriculture with the hope that such development would enhance productivity and translate to a better living condition arising from improved income generation from sales of increased agro-produce. In Nigeria for instance, a number of agriculture development programs were put in place across the phases of national development. Between the 1970s and 1980s is the enactment of agricultural programs, such as the National Accelerated Food Production Program (NAFPP), Operation Feed the Nation (OFN), Green Revolution, Agricultural Development Program (ADP), and recently from 2012 is Agricultural Transformation Agenda (ATA). Similarly, the Chinese rural reform, which has experienced great development in today's world, began with agriculture owing to the fact that majority of the rural China largely depends on agriculture as means of livelihood. Among the enacted agricultural programs by the Chinese rural development, policy include decentralization of agricultural production, green revolution, commodity-based production, and liberalization of the agricultural market [21, 22].

The development of agriculture rests on the holistic development of rural areas [14]. For increased production or yield of staple foods, it requires that the rural poor have to legally secure entitlements to assets such as land, water, and technology,

access to markets and microfinance, and opportunity to participate in decentralized resource management [6, 11]. Attainment of increased rice productivity, but at more than a 600 million tons per year in today's global economy, was based on the enactment of a holistic rural development strategy that ensures the provision of necessary agro-support services alongside the integration of rural infrastructure. The underlying rural development programs that achieved the success of increased agricultural productivity in China include household responsibility schemes, non-farm reforms, rural infrastructure development, integration of micro-finances, and anti-poverty schemes [23, 24].

In the same vein, Nigeria equally lunched rural-life-oriented schemes among which are Food, Road and Rural Infrastructure, River-Basin Development, National Agricultural Land Development Authority (NALDA), National Agricultural Insurance Corporation (NAIC), and Agricultural Credit Guarantee Scheme (ACGS). Better Life for Rural Dwellers (BETTER LIFE), Family Support Program (FSP), National Directorate of Employment (NDE), National Poverty Eradication Program (NAPEP), National Rural Roads Development Fund (NRRDF), Rural Banking Scheme (RBS), Structural Adjustment Program (SAP), Family Economic Empowerment Program (FEAP), Universal Basic Education (UBE), Rural Infrastructure Development Scheme (RIDS). With these institutionalized rural-based development programs in China and Nigeria, the question at hand is: what impact did the enacted agricultural and rural development programs have on the rural system? To provide a convincing answer to this question, it becomes essential to take an in-depth examination of the underlying principles of the development programs and the implementation strategies.

3. China's rural situation and the reform programs

3.1 The Chinese pre-reformed rural systems

Before now, the Chinese rural system was largely characterized by poor infrastructural development and poor living condition. According to Yupeng [25]; Ahluwalia [26]; Long et al. [27]; Su et al. [28], China's rural environment is occupied by about 55% of the Chinese population with the majority of them relying on agriculture as the main means of livelihood. The rural production performance was however deficient to the extent that the Chinese agricultural growth was just about 2.5% [19]. As of the 1970s, the country's Gross Domestic Products (GDP) was below that of the sub-Saharan Africa, which was put at $1071 [17]. Owing to poor infrastructural development and institutional support services, the Chinese life expectancy was 62 years; and the illiteracy level was as much as 49% [19]. With this situation, the country was classified among the third world countries whose economies were agriculture-based and largely characterized by poor social and economic development.

An attempt to revert this disparaging life condition in rural china stimulates the enactment of a number of rural development programs among which are the household responsibility schemes, non-farm reforms, green revolution, rural infrastructure development, integration of micro-finances, and anti-poverty schemes. The programs were to care for the vulnerable groups that may not be directly benefited by other urban-based transformation programs [19]. The success of these development programs however rests on the conscientious implementation of the programs in line with the underlying principles guiding the purpose of each of the programs. The Chinese rural reform programs thus take the following guiding principles:

3.1.1 Human development

This reform agenda centered on human development and as such, the reform policies were designed to take care of the impoverished groups and ensure wealth creation for all. In the light of this, the reform guidelines call for integration of the urban, rural, regional and domestic development with openness to the outside world in order to bring about the system's socio-economic and human development. In the light of this, key poverty-stricken counties were identified and reached out to with support services. In this regard, the poor farm families, or at least one person from a household, were trained on non-agricultural economies the State Council Leading Group Office of Poverty Alleviation. In view of this, about 90% of the trained peasant farmers found non-agricultural employment as an alternative or additional means of livelihood is greatly supported [23].

3.1.2 Social mobilization of stakeholders for reforms

In an attempt to ensure a far-reaching effect of the human development programs, steps were taken to mobilize and organize people from all walks of life to join in the development and construction of the poverty alleviation programs. In this regard, provinces, prefectures, and counties were organized under the state, government organs, and large state firms to support the poor. In the same vein, private firms were encouraged to invest in impoverished areas and NGOs sponsor children in poor households on compulsory basic education; poor mothers were given support services by the Chinese Population Foundation, and the Women Federation worked at increasing women's income. In addition, the State Council Leading Group Office of Poverty certified up to 260 industrialized enterprises to participate in poverty reduction, and by this, about 3 million impoverished households and 12 million poor people were supported for economic growth.

3.1.3 Spirited self-reliant efforts

This reform approach aimed at effecting change on the poor peoples' attitude from dependence on external supports to self-reliance and hard work such that they could improve their basic production and overcome the impediments of poverty for the attainment of better living conditions. The emphasis here is on the stimulation of the impoverished people's initiative to participate in the design and implementation of poverty alleviation plans. This forms the basis for the initiation of the household responsibility system approach as a tool for the transformational development of the Chinese rural system. Under this approach, the rural households were empowered to decide what and how many farms enterprise(s) to produce with greater control over the land and resources for their farm enterprise production.

3.1.4 Employed integrated development approach

For the social and economic development of the rural system, the Chinese authority embarked on an integrated approach whereby poverty alleviation programs were integrated in science, education, health, and infrastructure for overall improvement of the impoverished people's capabilities. In the light of this, a National Poor Regions Compulsory Education Project was put in place to provide and universalize a nine-year compulsory education and illiteracy eradication among the middle-aged and young people. In this regard, the central finance appropriated special funds to support compulsory education and rebuild and expand the rural junior high school, provide free textbooks, subsidize the pay of teachers and

administrative staff in the poverty-stricken regions. In the area of healthcare, medical reliefs were administered to the poor households to treat and prevent illnesses, and the poor households were educated and encouraged to decrease their births through family planning.

3.1.5 Oriented economic development

Economic development of the rural system and the country as a whole strongly depends on agriculture, particularly food and industrial development. In view of this, the Chinese government explored and exploited the agricultural sector, not just for poverty alleviation of the rural system, but also for the industrial and economic growth of the country. This feat was achieved through the structural adjustment of agriculture to bring about agricultural diversification, under which the Chinese economy shifted from staple food production to high-value agricultural products such as fruits, vegetables, milk and milk product, meat, egg, and fish, to meet the human's changing consumption pattern and the rising demand for products at both the national and international level.

3.1.6 Leadership and governance

For the attainment of sustained, healthy, and stable economic development, and prevention of marginalization of the impoverished people, the Chinese government strictly adhered to the concept of rapid economic development that is human-oriented. As further indicated by Liu [23], the policy of supporting impoverished groups and achieving wealth for all is an unswerving tenet to the Chinese government. With the political-will, strong sense of commitment, and genuine spirit of human development, the Chinese government at all levels did not only incorporate poverty alleviation programs into their overall economic and social development strategies but as well increased budgetary allocations for meeting the poverty alleviation goal. In this regard was the establishment of supporting policies and formidable organizations and leadership to fulfill the set agenda of poverty alleviation and economic growth of the poor or impoverished. Also established were poverty alleviation administrative structures at the national, provincial, prefecture, and county levels for the organization and coordination of the national and local poverty alleviation and development. For effective implementation and assured benefits of the poverty alleviation programs, the key poverty-stricken counties were identified and reached out to through the poverty administrative structures.

4. Impact of the Chinese reform agenda on socio-economic wellbeing of the rural system

Based on China's rural reform programs, the country is known to have transcended the economies of all its contemporary developing countries, rising to become the second-largest global economy after the United States [17]. In the same vein, Xiaohua [29] submit that China has not only made great advances in its agricultural and rural development dives since the country began its reform in 1978 but has been able to feed its population of 1.3 billion and contributed to international agricultural development and food security. This remarkable achievement began with increased productivity from 2.6 to 7.1% per annum from 1978 till date. According to von Braun [19], China's grain production greatly increased over eight consecutive years reaching 571.2 million tons in 2011, and now to more than a 140.5 million tons. Arising from this exponential growth in agriculture, rural people

found their incomes rising by 15% per annum between 1978 and 1984. In the same vein, Jiabao [30] pointed out that rural net per capita income has been on a steady increase over several years and reached about 6900 Yuan in 2011.

The success of the early agriculture-led reforms, as indicated by Gulati [17], also brought about increased demand for non-agricultural goods thereby leading to the release of a surplus of labor and capital into the rural nonfarm sector. In this wise, the revamped agriculture opened up the opportunity for the development of small-scale food-processing plants, machinery repair shops, and increasingly more modern and technology-intensive industries to meet the growing demand of the well-off farmers for production and post-harvest handling support services, and creation of job opportunities for employment of millions of people whose labor were no longer needed on farms [19]. As the rural nonfarm economy thrived, it not only provided farmers and rural areas with added opportunities for expanded investment outside agriculture and its allied sectors but also put pressures on the reform of the urban economy thereby triggering macroeconomic reforms and adoption of measures, such as the special economic zones, to increase foreign investment. Consequently, the contribution of the nonfarm sector to Chinese GDP moved from almost none back in 1952 to about one-third as of today.

Other impact of the transformed agriculture in China is the breath-taking reduction of poverty, from 33% of the population in 1978 to 3% in 2001 [17]. This decline was most substantial in the first phase of the reform when agricultural GDP grew at 7.1% per annum and rural poverty dropped from 33 to 15% within the first 6 years (1978–1984). And thereafter, systematic large scale poverty and development by the Chinese government from the mid-1980s brought about a great reduction in the number of impoverished people without enough food and clothing from 250 million in 1978 to 26.1 million in 2004, with the share of the population living in poverty falling from 30 to 2.8% [23]. The accompanying provision of public services as an important means of narrowing the gap between rural and urban areas led to the provision of improved infrastructure, construction, and upgrade of rural roads, provision of potable water for rural dwellers, repair of dilapidated houses, provision of education and medical services for the rural dwellers [30]. Investment in the non-farm sector equally boosts the development of small-scale food processing plants, machinery repair shops, and modern technology-driven industries to support the country's agricultural growth. The nonfarm reforms thus brought about the employment of millions of people, especially those whose labor was no longer needed on the farms, contributing about one-third of the country's GDP. The resultant effects of these approaches, as pointed out by Zhang et al. [31]; Xu and Tan [32], were tremendous changes in the rural population, their lifestyles and culture, community organization, employment, and industrial structures. In view of these provisions, Guoxiang [33] expresses that the gap between rural and urban incomes and livelihood status is decreasing.

5. Rural situation in Nigeria and the reform programs

Rural environments in Nigeria, as in most other developing and/or sub-Saharan African countries, is largely characterized by poor living condition arising from the provision of little or no infrastructure and social amenities that are essential to the attainment of quality life. As expressed by Muoghalu [34]; Usman [35], rural life in Nigeria is greatly characterized by the vicious cycle of poverty; poor infrastructure, high level of illiteracy, low social interaction, and local politics, and little or no rural-urban migration. With this situation, it is extremely difficult for the rural

dwellers, most of whom are farm families with agriculture as their primary means of livelihood, to be economically productive or become integrated in agricultural markets. According to Okuneye [36], Nigerian agriculture, which contributes about 50.2% of the country's GDP between1960 and 1970, has gradually declined to about 20% in the 1980s, and to less than 5% in the 1990s [37]. The need to avert the poor living and economic condition of the rural environment underscore the enactment of a number of rural development policies and programs at one time or the other by the successive governmental regimes in the country. Among the enacted agricultural and rural development programs in Nigeria were:

5.1 Agricultural development programs

Among the popularized agricultural programs in Nigeria, as highlighted by Adeola and Oluwafemi [38], include National Accelerated Food Production Program (NAFPP), Operation Feed the Nation (OFN), Green Revolution, and National Agricultural Land Development Authority (NALDA). The programs aimed at ensuring increased food production for both home consumption and exportation for international marketing. In view of this, the NAFPP put up in 1973, had its focus on increased production of food crops for assured food security. Integrated in the program were tractor and machinery distribution services and provision of research-based technologies or improved packages. The OFN, put in place in1976, was to popularize agriculture for the practice among the citizens in general as a way to ensure increased food availability and to reduce food expenditure at the household levels. The Green Revolution adopted in 1980 was patterned after Asian success stories on the integration of the Green of Revolution concept in their agricultural development programs with the aim of effecting large-scale agricultural production system in Nigeria.

5.2 Agricultural support service

In an attempt to enhance and ensure attainment of developed agriculture in the country were integration of support services such as Agricultural Development Programs (ADP) and River-Basin Development Authority (RBDA) nationwide. The ADP, developed in 1975, was adopted to provide extension service delivery to the farmers, drawing innovative and technical information from the research outputs to guide the farmers on technicalities of farm practices [39, 40]. In view of this, a network of research-extension-farmer-input linkage systems was put in place to ensure that research; extension, and input service delivery are readily available to the farmers for improved productivity. The RBDA, set up in 1976, functions to provide irrigation service with a view to ensuring that farmers are in production all year round or save them from dependence on the unpredictable rainfall pattern in the country [41, 42].

5.3 Rural infrastructure development program

In an attempt to address the challenge of the poor state of infrastructure in the rural areas, which is believed to be crucial to the attainment of agricultural development, was the institution of the Directorate for Food, Road and Rural Infrastructure (DIFRRI) and Rural Infrastructure Development Scheme (RIDS) in 1986 [43]. The scheme functions on the mandate of opening up rural areas through the development of feeder roads, rural electrification, and water resources development through well and/or borehole drilling, construction of schools, and health centers.

5.4 Agricultural-based financial support services

In order to provide financial back up for the farmers as capital or investment base Agricultural Credit Guarantee Scheme (ACGS), Nigerian Agricultural Credit Bank (NACB), Peoples Bank of Nigeria (PBS), and National Agricultural Insurance Corporation (NAIC) were institutionalized across the country. As it were with China's financial provision under its integrated development programs, the Nigerian agro-based financial institutions were put in place to provide financial service to the farmers for enhancement of their production capacity and resource acquisition, and insurance of their farm enterprises against possible agro-based disaster in terms of crop failure, flooding and crop destruction by an infestation of pests and diseases.

5.5 Structural adjustment program

In an attempt to ensure self-reliance and discourage heavy dependence on foreign donors, the nation embarked on Structural Adjustment Program (SAP). The program, which though is an economic policy promoted by the World Bank and International Monetary Fund (IMF) in the early 1980s for developing countries, aimed at ensuring adjustment of the social and economic structures of Nigeria from the narrow mindset of heavy dependence on oil and importation of goods and services to diversification into other resource exploitation and inward development of the nation's social and economic wellbeing. In essence, SAP, as indicated by Kwanashie, Ajilima, and Garba [44], was designed to induce structural and institutional changes necessary to reorganize the productive structure of the economy so that self-sustaining growth could be attained. The scheme was meant to stimulate and ensure that rural households were empowered to decide what and how much farm enterprise(s) to produce with greater control over the land and resources for their farm enterprise production.

5.6 Mass mobilization for socio-economic development

Attainment of national development, as globally acknowledged, is certainly beyond individuals' efforts thus, the need for mobilization of stakeholders in development. This action was enacted in form of Mass Mobilization for Social and Economic Recovery (MAMSER) by the Federal Government of Nigeria whereby stakeholders in development were mobilized for organization and taken of actions on development and economic recovery of the nation. This entails the integration of private entities in partnership with the Government to encourage investment for employment generation and economic development in a wider spectrum of both rural and urban coverage.

5.7 Human capacity development and empowerment scheme

The need for human capacity development for enhanced skill development and empowerment for increased productivity and quality life were the establishment of human development schemes such as the National Directorate of Employment (NDE), Universal Basic Education (UBE), and Primary Healthcare Services (PHS). The NDE had the function of effecting human capacity development in terms of entrepreneurial training for skill acquisition on goods and service production such that the trained individuals become gainfully employed by starting off a business on what such ones were trained. Such training in some cases were agro-based especially for the non-farm family-oriented person; and in most cases, on non-agro

entrepreneurs. The UBE on the other hand functions to provide basic elementary education for the literacy development of Nigerians across the rural and urban areas. The program thus emphasizes child or children of school-age enrolment in primary schools for basic education. Part of human development capacity is the attainment of good health status and in view of this was the enactment of the PHS to provide basic health service to families and especially for children under age five. The commonly provided health services for children include child immunization against polio, measles; and for mothers are child delivery, malaria, and tuberculosis treatment.

5.8 Poverty alleviation programs

In view of the need for eradication or reduction of the poverty level of rural China was the enactment of integrated anti-poverty programs. In the same manner, was the establishment of anti-poverty programs for the Nigerian rural and urban system. The programs include Better Life for Rural Dwellers (BLRD), Family Support Program (FSP), National Poverty Eradication Program (NAPEP), Family Economic Empowerment Program (FEAP). These programs provide the rural poor and other vulnerable groups with either agro-based or non-agro-based employment for income generation satisfaction of their basic needs of life. Integrated in the anti-poverty programs were training for skill acquisition and provision of entrepreneurial production tools such as sewing machines, hair driers, refrigerators, to start a business thereby generating income to make a living. Alongside this were provisions of vehicles—which take the form of taxi cabs or commercial busses, motorcycles, and tricycles for transportation services for some individuals.

5.9 Rural development funds

In an attempt to financially support the enacted programs came to the institutionalization of financial institutions, namely the National Rural Roads Development Fund (NRRDF), Rural Banking Scheme (RBS), and Community Banks—now Micro Finance Banks. These institutions had the mandate of providing financial backup for effective implementation of development programs, particularly support for the rural and small-scale entrepreneurs that might key into the enacted programs.

6. Impact of the Nigerian rural development approaches in relation to China's rural systems

Given the background information into the Nigerian rural system and the country's rural development programs, the expectation is to have a rural environment with social amenities and infrastructure that supports a better living conditions in the areas and increased agricultural productivity. Although the rural development programs at the onset had a measure of impacts on the rural economy and the nation at large, such impacts had proven to be temporary as the Nigerian rural situation remains in a sordid state [45]. The environment has either remained the same as it were at the inception of the enacted programs for its development or has further been plunged into poorer conditions. The areas still lacked access roads thereby making mobility between communities or farms, extremely difficult for the rural dwellers, and as well much difficult to transport farm produce from the farms to markets. With the high perishability of agricultural produce, non-provision of post-harvest storage facilities and poor marketing system often result in great losses

of what is strenuously produced by the farmers. To avoid maximum losses, most farmers had to sell their produce at give-away prices thereby making their ventures unprofitable with attendant impoverished living status. Water is essential to life and comfortable living; lack of potable water sources has continued to hinder good sanitation practice and health conditions of the rural dwellers.

Human capacity development of rural dwellers remained poor as they lacked access to good education and training for intellectual development. Few available primary and post-primary schools are poorly equipped and at a far distance to most the rural communities. With a poor transportation system for mobility, it becomes extremely difficult for the school-age children to attend schools and as well difficult to acquire quality education due to inadequate teachers and lack of quality and adequate teaching and learning facilities in the schools. Similarly, is a lack of health facilities for quality and affordable healthcare of the rural dwellers. For this reason, rural dwellers largely relied on traditional healthcare, using herbs for healthy living conditions. Where the taken herbs could not address the encountered ill health, the implication is the hindrance of production functions and social and economic performance.

In view of this situation, Nigeria's rural areas are highly detractive for settlement and social engagement; and as such, rural dwellers, particularly the youths, readily desire to migrate to the urban areas for settlement. As indicated by Olayiwola and Adeleye [46], most development programs hardly trickled to the Nigerian rural areas; and where it does, it is usually of little and temporary benefits to the rural dwellers. Consequently, the country's rural areas remained poverty-stricken with no alternative job opportunities to agriculture. The situation is so bad that most rural families find it hard to meet the basic needs and other essentialities of life, which range across food security, responsive health management, acquisition of protective shelter, welfare development, and productivity of the individual World Bank [47–53]. In line with this, Okafor [54], succinctly expressed that, the rural system in Nigeria, like in many of the third world countries, has been greatly neglected. In view of these, the questions at hand are: why do the enacted rural development programs in Nigeria fail to achieve the expected goal of rural transformation? Are the programs inappropriate or poorly implemented? Are there lessons that could be learned from China's development strategies? Arriving at satisfactory answers to these questions calls for in-depth review and critical analysis of technical issues that underlay the success stories of China's rural development systems and the failure of Nigeria's situation.

7. Rural development programs implementation in Nigeria and the veering locus from China's success story

A critical look at the Nigerian rural situation in relation to the pre-reform rural situation in China shows the same trend of poor living conditions in both countries' rural areas with agriculture as the dominant means of livelihood. In an attempt to address the rural challenges, multidimensional rural development programs were separately developed and deployed by both countries but differently implemented. A side-by-side comparison of the programs between Nigeria and China's rural development programs shows strong and correlated similarities between the two countries. A careful look at the enacted rural development programs by the Chinese system shows a simultaneously developed and implemented multiple programs. This implies that a multidimensional or integrated approach [54], is essential to addressing the multi-dimension social and economic challenges confronting the rural environment. While the agricultural development programs set the pace for

increased farm enterprise productivity, the non-agriculture or social development programs not only enhanced the quality of rural life but also aided agricultural productivity [19, 23]. Similarly, the multiple rural development programs in Nigeria are meant to enhance economic productivity, income generation, and quality of life, through health care, nutrition, and education of the rural people. However, the much-desired rural transformation has failed to materialize in Nigeria's context [55, 56]. If the rural development programs by Nigeria and China were similar, why then was the failure in Nigeria against the Chinese' success story? Critical exanimation of the implementation of the enacted rural development programs in the two countries shows the veering locus in the Nigerian mode of program implementation from that of China; and are thus reflected as:

7.1 Isolated program development

In as much as rural development requires a multidimensional approach, the programs have to be interconnected for synergic goal accomplishment. The multiple rural development programs in Nigeria were rather developed and implemented in isolation of one another rather than collectively coordinated. This is large because each of the rural development programs in Nigeria came up at different times under different governmental regimes to reflect the "programs and policies of the individuals occupying the seat of governance" or often launched to "reflect their regime" and not necessarily in the interest of national development [57]. This submission is underscored by the fact every rural or development programme by outgone governments is often jettisoned and replaced by a new one. This is not the case with China as the country conscientiously developed multiple rural-oriented programs and collectively coordinated for rural and national development. According to Liu [23], China in its pursuit of poverty alleviation and development programs charted a suitable path through agricultural and non-agricultural programs that take the form of household responsibility system, liberalized agricultural product markets and prices, a market-oriented reform, rural education, and rural tax and fee reform [58]. Concurrent coordination of these programs, as highlighted by Lin [59], makes the agricultural program center on moving the agriculture from collective farms to individual household farms and moderation of grain supply; poverty alleviation program address rural income stagnation, rural and urban income disparity, and between the prosperous coastal areas and the hinterlands.

7.2 Lack of political-will

The enviable transformational development of the Chinese rural system certainly did not come by chance, but by concerted efforts and required political-will to have the planned programs implemented accordingly [17, 30, 33]. According to Zhang and Guoqiang [58], the Chinese government policy for rural development was based on the principle of "give more, take less and liberalization". Expatiating on this, Liu [23] expresses that the policy of supporting impoverished groups and achieving wealth for all, and to keep a stable and healthy living is an unswerving tenet to the Chinese government. This is a major problem in program implementation in Nigeria. Programs and policy implementations are never backed with the required political-will thereby botching transformative potentials of any enacted rural development programs. Rather than conscientiously implements development programs for national development, enacted programs are seen as an opportunity for self-enrichment—taking more and more from the system to impoverish the citizens, particularly the rural dwellers, instead of making it "give more, take less and liberalization" as done by the Chinese government. This situation made Nigeria

fits Laah et al. [60] submission that agricultural policies of many countries in today's world are not well-aligned with stated government objectives of increasing agricultural productivity improvement of farm household well-being.

7.3 Lack of investment in rural infrastructure

The exposition of the Nigerian government's lack of commitment to rural development is further underscored by the lack of investment in rural infrastructure and social amenities. Unlike massive investment drives on rural infrastructure by the Chinese government, hardly could any substantive investment in rural infrastructure could be seen in Nigeria. According to Zhang and Guoqiang [58], alongside budgetary expenditure of RMB 339.7 billion on agriculture, the central government allocated as much as RMB 53 billion as rural construction fund rural education, healthcare improvement of rural living, and production conditions. The Nigerian government however veered in this respect with no commitment to investing in rural infrastructure. Although there are claims of budgeting huge sums of money for rural development by the Nigerian governments, there is little or nothing on the ground to prove the claims as rural communities in the country grossly lacked infrastructure and social amenities to support quality living, and as well lacked social support services for improved production and diversification of both agricultural and non-agricultural enterprises.

7.4 Lack of mobilization and social participation

Attainment of rural development in China was by collective efforts of all relevant sectors, with each sector fulfilling specific roles in line with the development agenda. According to Liu [23], the Chinese government took a number of steps to mobilize and organize people in all walks of life to join the development and construction efforts in poverty-stricken regions—an approach that reflects the socialist system. The Nigerian rural development system veered in this regard by failing to mobilize relevant sectors, particularly the local fabricators that are crucial to enhancing the farmers' production capacity through the production of motorized farm implements and post-harvest handling machines. On this note, the initially recorded increased agricultural productivity could not be sustained as farm produce could not be preserved to guarantee future supply for the market.

7.5 Lack of genuine empowerment of rural people for self-help

Attainment of rural development is not solely by governmental or external interventions, but also by the motivation of the rural dwellers for self-help through empowerment. In the light of this, the Chinese rural development strategy centered on encouraging the rural poor to become creative, and through self-help, improve their living condition. As expressed by Liu [23], the emphasis was on respecting impoverished people and stimulating their initiative to participate in designing and implementing the poverty alleviation plans. In the light of this, essential assistance from the Chinese government and all other stakeholders in rural development made the rural dwellers overcome the common attitude of "wait, depend on, and ask" to develop a spirit of self-reliance and hard work. With these spirited efforts, rural China outpaced its poverty status for better living conditions. Nigeria's rural development programs greatly veered in this context as the rural dwellers are hardly carried along or integrated in the design and implementation of development programs. Likewise, the rural dwellers are hardly given essential support, in terms of capacity training on production and value addition, for improved productivity

or living condition, either by government or non-governmental organizations. The practice of distributing meager monetary and material gifts to rural individuals has greatly made them be less creative but be highly expectant and dependent on what could be done for them.

7.6 Lack of monitoring mechanism on program implementation

The value of every development program lies in its timely and appropriate implementation. To ensure this is the need for monitoring and evaluation, not only of the programs but also of allocated resources. This tool plays a major role in effective program implementation in the Chinese rural development drives as the government ensures that budgeted poverty funds reached the designated impoverished farmers through a transparent distribution and monitoring mechanisms for feedback and outcome evaluation. This mechanism is grossly lacking in program implementations in Nigeria thereby creating the opportunity for corrupt government officials and participants in program implementation to either divert or siphon the funds with impunity.

8. Conclusion and recommendations

A comparative consideration of China's rural development approaches in relation to Nigeria shows a marked difference in their respective achievements. While the transformation approaches by China have made the country become a formidable force in the global economy, Nigeria's economy, especially the rural economy, has remained stunted owing to the ineptitude implementation of rural development programs in the country. Unlike the entrenched political-will and sense of commitment that brought about transformational development of the Chinese rural systems, the Nigerian efforts at rural development and economic transformation failed to see the light of the global economy largely due to poor leadership and governance, poorly developed and/or implemented economic policies, lack of innovative skills and creativity, and widespread corruption. A critical look at the Nigerian development approaches does not in any way suggest that the schemes were inappropriate or inefficient, but were inefficiently implemented. The ineptitude with which the rural development efforts were implemented in the country underlies Adebayo [48] description of the whole lots as *episodic drama, soap opera, and comedy*. As may be inferred, drama, either in form of soap operas or comedy merely entertains, much more temporarily, without any lasting or meaningful impact on the viewers. The epilogue to the episodic description of the Nigerian rural development efforts thus suggests that the country is highly characterized with the drives for enacting rural development programs but with no genuine commitment and the political-will to effectively implement for transformational development of the rural system in the country. This situation is further shackled by a high level of corruption in nearly all spheres of social-economic endeavors in the country. Consequently, the country, as indicated by The World Bank (1996); Aigbokan, [50]; Ogwumike [53]; Adebayo [48]; Obuah [52]; Lawal-Adebowale [51]; Afolabi [49], has remained ravaged by food insecurity, poverty, high level of unemployment, and recently, insecurity of lives and properties.

In the light of this, the poorly implemented rural development approaches would have to be redirected and ensure that the programs are actually rural-oriented, with strong commitment and political-will to have the programs implemented. Rural development programs should not be limited to agriculture for increased productivity but should be multi-dimensional to simultaneously care for

the non-farm components. This should include rural infrastructure, health services, and education, capacity training on value addition, and postharvest handling alongside market integration. Social mobilization and participation of all walks of life are essential to achieving sustainable rural development. In this wise, government at all levels would have to create enabling environment for non-governmental and private sectors, comprising agricultural researchers, local fabricator of agro-machines, agro-processors, and industries, marketers and entrepreneurs' participation for a holistic approach to rural development and synergic realization of meaningful impacts. Alongside this is the need for effective coordination of the programs and mobilization of members of the rural system for participation in the design and implementation of development programs meant for them. And there should be an orientation of rural dwellers, and the citizens at large, for collective actions and support for successful implementation of the enacted rural development programs in the country.

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Chapter 4

Information for Rural Development in Africa

Austine Phiri

Abstract

Information is one of the major contributors to sustainable development in Africa. Access to relevant information would offset the emerging challenges in market supply chains, climate change and shrinking natural resources. At the same time, information can help to reduce poverty and creating economic opportunity for the majority of the rural populace in Africa. Further growth of ICT can enhance lifelong learning and impart skills and knowledge for individual and societal growth. This growth in skills and knowledge would also impact access and use of information in agriculture, health, transportation and economy. Information is very important in business by presenting data in a way that can be interpreted by management and support growth in the industry. Relevant information can support teaching and learning and improve quality sustainable education development in Africa. The chapter proposes that access and use of information in Africa can be enhanced by designing and improving the existing information infrastructures such as the internet and information centres. Legislations such as Access to Information and others would compel African governments and institutions to reconsider the role of information for sustainable development and consequently use it for decision making and competitive advantage.

Keywords: information, knowledge, rural development, sustainable development, Africa

1. Introduction

The dawn of the new millennium has seen many possibilities for growth and development in Africa. Africa is positioned as the centre of trade and growth of the economy by 2050. Growth in the areas of the economy, agriculture, technology, transportation, and education will drive the current and prospects of economic prosperity in Africa. As economic growth in Africa is inevitable, the aspects of sustainable development are of particular concern. As the desire for economic growth improved standards comes into the picture in Africa, there is a need to carefully consider stabilising the natural resources as they are exploited to support growth. Access and use of Information and knowledge in Africa are important to support future economic growth and consequently sustainable development. This chapter will attempt to create a convincing association between access and use of information and knowledge and sustainable development in Africa. The discussion will revolve around sustainable environmental management, sustainable agriculture development, economy, technology, transportation, business and education for sustainable development. The concepts of information and knowledge and

sustainable development have been discussed to offer a context for information for sustainable development in Africa.

The sources of literature for the chapter were journal articles, published and unpublished dissertations, technical and research reports, and archival documents and collections. The sources of literature were accessed from databases such as World Bank, United Nations Development Programme, United Nations Conference on Trade and Development, United Nations Office of the Special Advisor on Africa, Food and Agriculture Organisation, New Partnership for Africa's Development, World Health Organisation, Government Ministers and Departments in Africa. Other sources were from journals such as Information Development, Developing Countries Studies, Journal of the American Planning Association, Chelsea Green, and Development. Other sources for the chapter were accessed from digital repositories such as Mzuzu University and University of Malawi repositories in Malawi, University of South Africa repository and Makerere University repository in South Africa and Uganda respectively. The search terms for the review were Information, Knowledge, rural development, sustainable development, and Africa. The inclusion criteria for information sources was that the information sources have to be peer-reviewed, less than 14 years old, except where the information source(s) was or were important and cannot be replaced with current source(s). The work has to be related to information and sustainable development in Africa and as such the sources reviewed were limited to African countries with a bias to a rural setting. Similar methodologies adopted for the chapter were used in literature review studies on agriculture information in developing countries in Africa by Phiri, Chipeta and Chawinga in 2019, Duta in 2009 [1, 2].

1.1 Concept of information and knowledge

Information and knowledge are highly regarded as the new 'factor of production', with equal contribution to human development as the traditional factors of production – land, labour and capital. It is an open secret and common knowledge in the twenty-first century that information and knowledge is the solution to any society's economic and social problems. Furthermore, information is considered as the most basic human need and a right. Despite the major contribution of information in social and economic development for the developing world, little attention is placed on managing and using such information. It is now a cliche´ to pronounce that Africa is the most underdeveloped continent in the world, where the majority lacks access to development-oriented information [3]. Trevor Haywood has called this marginalised group that has no access to the world's surplus knowledge, 'the information poor' and another with access to the essential information resources "the information-rich" [4]. There are numerous contributing factors to this sad situation in African and the situation is dire in a rural set-up with limited access to infrastructure and other basic facilities such as information centres, roads, schools, and hospitals. Partly, the cause of the problem is the lack of exposure to the importance of evidence/information which is key to development. This writing will demonstrate the practical contribution of information to sustainable rural socio-economic development in Africa.

Access and use of information resources largely depend on physical and technical connectivity. Rural setup in Africa is largely marginalised in terms of the availability of the physical infrastructures and let alone technical connectivity [5]. Most of the rural areas of the continent have no access to these information resources due to the lack of relevant infrastructures. Therefore, there is an urgent need to construct roads, schools, information centres and internet cafes to enable the rural population to access all types of information that concerns their everyday

lives [5]. Further still, ICT skills (or lack thereof) represent yet another defining characteristic of access to and use of information and technology. Equipping the rural people with skills on means of navigating the web can greatly influence their ability to access and use the information and consequently help others in accessing the information on the internet and other information centres. Therefore, understanding the social dimensions of the society such as poverty, race, age, caste can greatly influence access and use of information for the sustainable social-economic development of Africa. According to the International Federation of Library Associations and Institutions, studying the social context that enables meaningful use of information also reveals the intersectional nature of information use – where the personal dimensions of identity overlap, reinforce, and multiply the resources and barriers of people and communities [6].

1.2 Concept of sustainable development

Sustainable development is the principle for meeting development goals while simultaneously sustaining the ability of natural systems to provide the natural resources and ecosystems on which the economy and society depend. The implication is that system of continuously using the resources to meet the needs of the society without undermining the stability of natural resources. Sustainable development can be defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The current framework of the United Nations Sustainable Development Goals addresses the issues such as poverty, inequality, climate change, environmental degradation, peace, and justice. Under the framework, United Nations Charter on Millennium Declaration identified principles to achieving global sustainable development such as economic development, social development and environmental protection. The term sustainable development as used by the United Nations incorporates both issues associated with land development and broader issues of human development such as education, public health, and standard of living [7].

Over the years, the concept of sustainable development has developed and the focus has been towards the issues of economic development, social development and environmental protection. Developed economies are striving to streamline their economic development agenda with obligations of protecting natural resources and ecosystems. This also shifts the focus from mere conducting round table commitments towards sustainable development to leveraging the same for economic development. The result is the economic development that recognises the existence and needs for sustaining the environment and ecosystem called Managed Sustainable Development (MSD). In the context of this chapter, the concepts of information and sustainable development will be discussed in the dimensions of four domains: ecology, economics, politics and culture. An attempt for discussion on the close relation of the concept of information and sustainable development in the light of the domains will be exemplified across the chapter.

2. Sustainable development themes and information

2.1 Environmental (or ecological) management

Sustainable development in the realm of the environment (ecology) is the act of creating a co-existence between human settlements and the environment. Therefore, human ecology broadens the focus of sustainable development to include the concept of human health. Human health includes the availability

and quality of air, water, food and shelter are also the ecological foundations for sustainable development [8]. Environmental sustainability concerns the natural environment and how it endures and remains productive. Since natural resources are derived from the environment, the state of air, water, and the climate is of particular concern. The issue of environmental protection is of importance in Africa. According to the Data from Institute for Security Studies summarised in **Figure 1**, Africa's population is the fastest-growing in the world and it is expected to increase by roughly 50 per cent over the next 18 years, growing from 1.2 billion people today to over 1.8 billion in 2035 [9]. It is further predicted that Africa will account for nearly half of global population growth over the next two decades [9]. These statistics are very worrisome and they eventually threaten the environment as the scramble for natural resources such as air, water and minerals will exponentially increase in the next decade. Therefore, environmental sustainability will require society to design activities or processes that address the demanding needs of the population while preserving the planet. This entails using water, renewable energy, and material supplies sustainably [10].

Integral elements for sustainable use of the environment in Africa are research and innovation activities. This eventually generates information and knowledge that inform present and future decision making on environmental protection. Access to information and knowledge at all levels of decision making and systems in the African society can truly create a lasting behavioural change on the human perspective of the environment and the responsibilities therein. Universities and research institutions can lead these activities of generating knowledge for environmental protection. Issues of funding are equally critical in this equation and more resources need to be allocated towards activities that lead to the generation of research data for environment protection. Public libraries and other information centres can support the dissemination and access of environmental information by the public. Many public libraries in African can provide information services beyond their physical location. Many public libraries have mobile libraries services that serve people in rural communities, offering books, services, and internet access. In Namibia, a country with one of the world's lowest rates of population density, mobile libraries travel hundreds of kilometres from the country's regional libraries to loan out books, provide Wi-Fi access, and allow visitors to use a computer and printer [6]. Equally, several initiatives are being done on access to

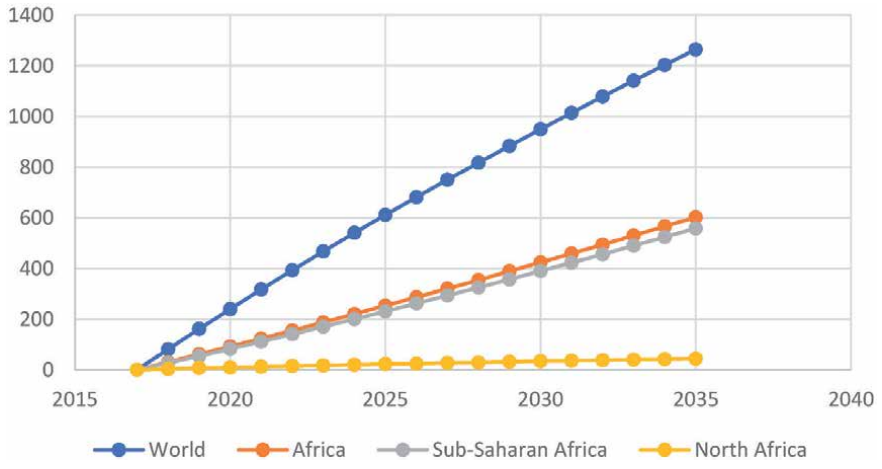

Figure 1.
Population increase forecast in millions, 2017–2035. Source: IFs v 7.26, historical data from US Census Bureau via CIA and United Nations population division (UNPD) 2015.

information that could benefit Africa as far as environmental protection is concerned. The most famous are the projects of Research 4 Life such as AGORA (Access to Global Online Research in Agriculture) and OARE (Online Access to Research in the Environment) with a focus on access to information on sustainable agriculture and environment in developing countries and Africa inclusive [11]. AGORA programme enables least-developed countries to gain access to a digital library collection of 3,500 journals and 3,300 books in the fields of food, agriculture, environmental science and related social sciences [11]. In addition, OARE provides access to information resources in a wide range of disciplines contributing to our understanding of the natural environment, including environmental toxicology and pollution, ecology, geography, environmental economics, environmental law, conservation policy, environmental engineering. The prospects of gaining potential from such huge literature can help support environmental protection initiatives in Africa through the provision of relevant information resources.

2.2 Sustainable agriculture development

Agriculture is the main economic activity for the majority of the rural population in Africa and a major contributor to the Gross Domestic Product index of the continent. According to the statistics in **Table 1** prepared by World Bank, African economies rely heavily on agriculture; for Sub-Saharan Africa, the agriculture sector's share in GDP was 12.7 per cent in 2009 and employed more than 60 per cent of the labour force [12]. Statistics on trade in Africa are indicated in **Table 1**. Therefore, venturing into sustainable agriculture would greatly support the African population and economy. Elements of sustainable agriculture include permaculture, agroforestry, mixed farming, multiple cropping and crop rotation [13]. It involves agricultural methods that ensure the stability and quality environment for humans for survival.

Access and openness of agriculture information and knowledge can positively contribute to creating lasting awareness among smallholder farmers in Africa on sustainable farming methods that stabilise the natural environment without depleting its natural ingredients. Individuals and communities engaged in the agricultural sector need accurate, timely and reliable information to increase production and improve their living standards [14]. Phiri, Chipeta and Chawinga further argue that a positive relationship exists between agricultural productivity and information access and use of rural smallholder farmers in Africa. Therefore, extension agents have a role to play in disseminating such information to smallholder farmers [14]. Generation and dissemination of such information would help tackle the emerging challenges such as improving efficiency in market supply chains, climate change and shrinking natural resources [3]. A sample of the projects on generating agricultural information for the developing world are Agricultural Learning Repositories

Sector	2005	2006	2007	2008	2009
Agriculture	16.9	16.4	15.4	12.4	12.7
Industry (inc. mining and manufacturing)	31.4	31.9	32.4	32.5	30.6
Manufacturing	13.1	12.6	14.0	13.6	12.9
Services	51.7	51.8	52.3	55.1	56.6

Source: Based on World Bank World Development Indicators 2010 Database.

Table 1.
Trade indicators in Africa.

Task Force – AgLR-TF, AgriLORE, and e-Agriculture community. Agricultural Learning Repositories Task Force – AgLR-TF is run by the Food and Agriculture (FAO) of the United Nations to create a network of organisations that promotes the development of an open and interoperable global infrastructure to facilitate sharing and reuse of learning resources on topics related to agricultural and rural development worldwide. AgriLORE is part of the National Agricultural Innovation Project (NAIP) being implemented by ICAR in India. One of the objectives of the project is to generate, review, manage and publish approved learning materials for wider use and re-use by distance learning institutions and interested rural and community organisations and extension agencies. The e-Agriculture Community is a global community of practice in which people worldwide exchange information, ideas and resources related to the use of ICT for sustainable agriculture and rural development. The essence of the projects is to enhance the generation and use of data and information through ICT for sustainable agricultural development in developing countries such as Africa.

2.3 Economy for sustainable development

Rural poverty strains the environmental resources as the majority of the population scramble for resources for their daily living. Therefore, environmental resources are important economic assets. In the 21st Century, the quality of life largely depends on sustainable use of the environment. According to United Nations Development Programme 2017 Poverty Statistics in Africa, indicated in **Figure 2**, poverty rates range from a high of 74.8 per cent in Niger to a low of 45.3 per cent in Burundi (See **Figure 2**) [15]. Therefore, access to knowledge and information resources would help to mitigate poverty levels in Africa and enhance the economic activities of millions of people on the continent. Poverty and economic standing significantly affect people's ability to use information meaningfully. At the same time, access does offer an avenue for reducing poverty and creating economic opportunity. Access to information, in its fullest sense, includes the production and sharing of information and multimedia, as well as the creation of physical objects. The use of wireless technology can help access information on the internet through mobile phones and computers. This approach can also help the youth to acquire skills and reduce illiteracy, inequality, ill-health and spur agricultural development in Africa. This can also be seen in outreach programs that target groups such as

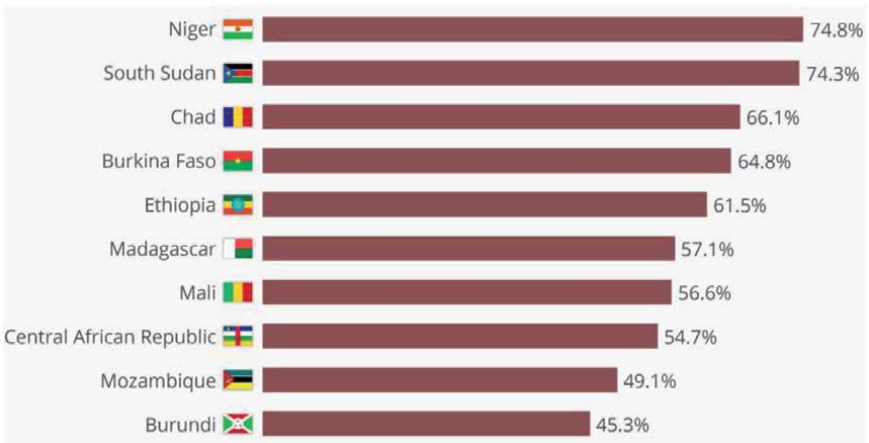

Figure 2.
Poverty levels in selected African countries. Source: United Nations development Programme, 2019.

workers in the agricultural or small-business sectors to help them improve their yields, find new markets, or increase sales through more effective business practices [6]. In this way, libraries support individuals' growth from passive consumers of agricultural products to active producers.

2.4 Technology for sustainable development

The last decade has witnessed the growth of the ICT sector in Africa and the information economy is becoming one of the main drivers for economic growth in general. For example, according to data in **Figure 3** by the South African Government, South Africa's ICT sector contributed more than 2.9 per cent to the country's gross domestic product (GDP) in 2012. The ICT sector in Tanzania contributed about 20 per cent to the country's GDP in the same while. It is projected that the ICT sector in the continent is growing rapidly with annual revenues estimated at around USD50 billion. One of the core concepts in sustainable development is that technology can be used to assist people to meet their developmental needs. Technology that endeavours to meet these human needs is referred to as appropriate technology. For example, In Burkina Faso, the Girls' Mobile Health Clubs found in four village libraries expand access to quality health information while also providing support to the participants to increase their information literacy and technology skills. In Ghana, the Volta Regional Library mobile library in 2012 to improve educational opportunities for students attending schools with limited resources through the provision of hands-on computer classes [6]. This intervention contributed to an increase of pass rate in ICT among the students to 50 per cent and additional funding for the expansion of the programme to other schools. These initiatives in these countries and other countries not discussed here

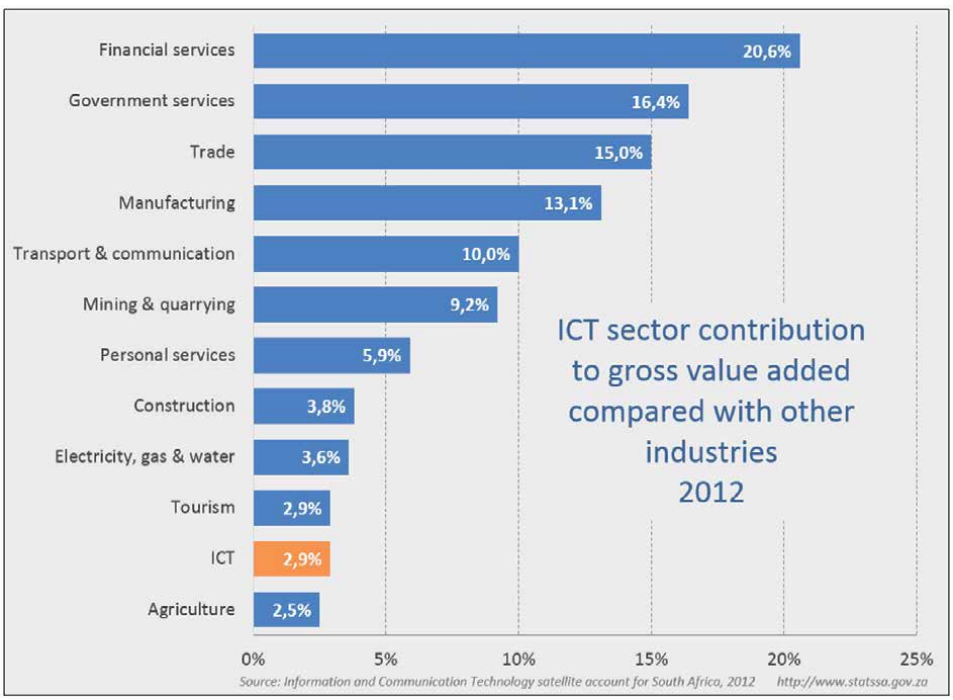

Figure 3.
South Africa's ICT sector contribution to GDP. Source: Information and communication technology satellite account for South Africa, 2012.

demonstrate the tremendous contribution of ICT to sustainability in various sectors of the economy such as health and education. Therefore, investment and consequential growth of ICT in Africa can improve the lives of the people through lifelong learning and access to various information through the infrastructure. Another landmark project with equal significance to the growth of ICT is ARDI (Access to Research for Development and Innovation) launched in 2009 by World Intellectual Property Organisation (WIPO) and partners in the publishing industry [11]. ARDI offers access to scholarly literature from diverse fields of science and technology and also promotes the integration of developing and least developed countries into the global knowledge economy, reinforcing the knowledge infrastructure and supporting researchers in creating and developing new solutions to technical challenges on a local and global level [11]. African countries can exploit these outstanding ICT initiatives and enhance the growth of the sector for sustainable socio-economic development.

2.5 Transportation for sustainable development

Sustainable economic growth and poverty reduction call for the development of all sectors of the economy to meet the needs of the current and future generations. Transport is one of the key sectors that play crucial roles in achieving the goals of poverty eradication and sustainable development. The transport sector in Africa is linked and stimulate developments in other sectors of the economy. Consequently, transportation contributes to the attainment of Millennium Development Goals (MDGs). Sustainable transport has many social and economic benefits that can accelerate local sustainable development. According to a series of reports by the Low Emission Development Strategies Global Partnership (LEDS GP), sustainable transport can help create jobs [16], improve commuter safety through investment in bicycle lanes and pedestrian pathways [17], make access to employment and social opportunities more affordable and efficient. It also offers a practical opportunity to save people's time and household income as well as government budgets [18], investing in sustainable transport a 'win-win' opportunity. World trade, in our increasingly globalised and networked economy, depends on the rapid and timely transportation of goods from manufacturing places to market areas [19]. Despite the positive contribution of the transport services to the sustainable development of Africa, the sector faces numerous challenges such as huge costs of transport systems and accidents and contribution to greenhouse gas emissions.

According to Working Paper no. 72 of March 2018 of Export–Import Bank of India, Africa's transport and insurance costs represent 30 per cent of the total value of exports, which compares unfavourably with 8.6 per cent for all developing countries [20]. The working paper further argues that some African countries incur high transport costs due to their landlocked nature. Accidents associated with the transport sector is huge in Africa. For example, over 225,000, or 19 per cent of 1.2 million people killed in the word were accounted for by deaths on African roads alone. Moreover, Africa has the highest number of road traffic accidents per capita. It is estimated that one-third of all gases produced are due to transportation [21]. Motorised transport also releases exhaust fumes that contain particulate matter which is hazardous to human health and a contributor to climate change [22]. Information can help to facilitate the logistical challenges in Africa as far as transport is concerned. Access and use of information can ensure the efficiency and effectiveness of an organisations operations. Information can help to quickly make decisions about issues of transport in the organisation. Efficiency and effectiveness in decision making can help to reduce delay costs of transporting goods and services by opting for efficient logistical organisations to handle the goods thereby reducing

delays in transportation. Information forms an important ingredient for improving the transport systems in Africa. Having access to the right information by institutions involved in the transport sector can help to reduce the risks of travelling through accidents and others by electing appropriate traffic signs and symbols. Information is equally important in reducing greenhouse gases emissions in Africa. Statistics on the amount of greenhouse may help policy formulation on instituting measures for reducing such emissions through various legislations on car manufacturing and certification.

2.6 Business for sustainable development

Currently, some African countries such as South Africa, Ghana, Mauritius and Tunisia are experiencing exponential growth in their economies [23]. In addition, the World Investment Report data of 2021 in **Figure 4** indicate that Foreign Domestic Investment (FDI) inflows to Africa are equally increasing year-to-year from 19.3 per cent and 3.5 per cent for the Democratic Republic of Congo and Nigeria respectively [24]. Economies in the African region are registering a steady growth attracting foreign investors. Several factors have positively contributed to this trajectory such as democratic and accountable government systems, economic policies, innovative information and communication technologies and the emerging spirit of entrepreneurship. Despite these opportunities, several challenges exist in the continent that impeded the further growth of business ventures. One such challenge is corruption which has serious consequences on the growth of businesses and economic stability. Others include civil unrest, poverty, high-interest rates of borrowing money and underinvestment in information and communication technologies. These challenges, among the others, pose a serious threat to the present and future growth of business and the economy in Africa. Of particular importance in the growth of the business in Africa is the power of data and information. Data and information are the facts and statistics needed for decision making in business and sustainable competitive advantage. It is believed that businesses with the right information on customers, products and others can influence the market potential of the products and grow their business. Therefore, to grow and manage business sustainably in the 21st century, high-quality data and information have to be available at all times at the disposal of the decision-makers. The value of data and information is equally important to the decisions made. This implies data and information on their own are meaningless without action/decision making. The value of data and information in business is equally dependent on actions being taken which may stimulate sustainable business development in Africa.

2.7 Education for sustainable development

According to United Nations Development Programme Report, Africa is the most youthful continent in the world with more than 200 million youth aged 15 to 24 [15]. A robust education system and employment opportunities for the majority of youth is key for economic development and growth in nations across the continent. The education system in African continues to grow with more students being enrolled in various schools. This calls for the huge infrastructure, teaching and learning materials and recruitment of several well-trained and qualified teachers. Students and teachers need access to relevant information resources to support their curricula. Access to relevant information is restricted in Africa due to several factors such as low budget allocation to purchasing teaching and learning information resources such as books and subscriptions to journals. In the 21st century, the internet is the major source of educational information globally but access to the

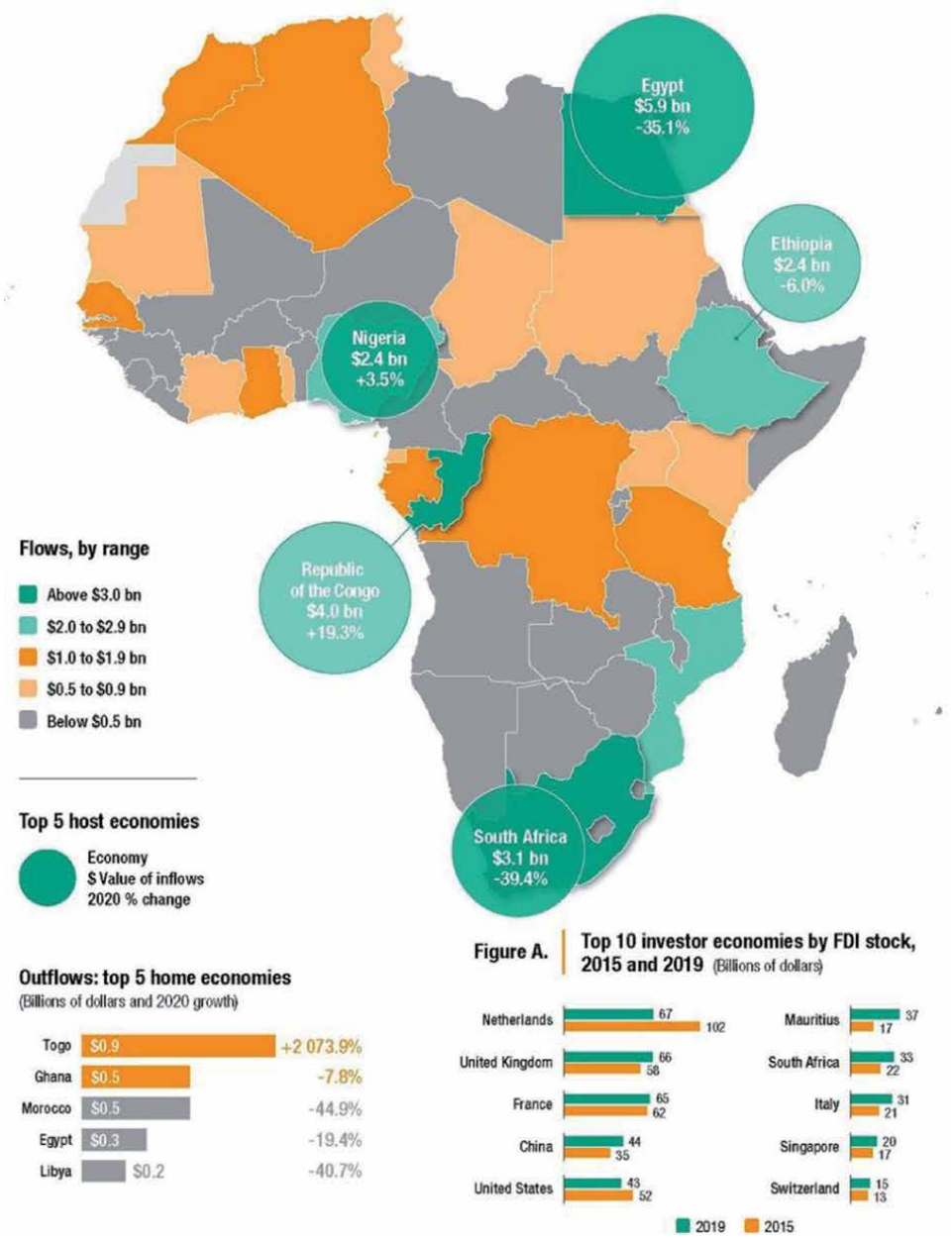

Figure 4.
Africa: FDI flows, top 5 host economies, 2021. Source: UNCTAD, world investment report, 2021.

facility is privileged. The Internet provides access to e-books, electronic journals and other important teaching and learning resources. Internet access by students and teachers in most educational institutions in Africa is compromised either due to lack of ICT infrastructure or the exorbitant cost of internet subscription fees. A positive development is that most African countries are devoting substantial portions of their government budgets to their education sectors, despite often relatively modest GDP's and many other developmental issues. It is a fact that the increase in government spending on education is by far not enough to reach essential education levels and to provide decent education opportunities for their young people. Despite all these problems, positive development and momentum are arising as the African

countries are allocating the largest portion of their governments' expenditure to their education systems reaching as far as 18.5 per cent. It is envisaged that this expenditure will positively impact internet access by students and teachers, thereby, providing avenues for access to relevant information resources for sustainable education development.

3. Conclusion

The discussion has offered arguments that information and knowledge contribute to sustainable development in Africa. Information has the potential to support different sectors of the African economy from environmental management to business growth. Access to information and knowledge in decision making can create a lasting behavioural change in our perspective of the environment. Dissemination of information would help tackle the emerging challenges such as improving efficiency in market supply chains, climate change and shrinking natural resources. In addition, access does offer an avenue for reducing poverty and creating economic opportunity. Investment and consequential growth of ICT can support lifelong learning and access to various information. Access and use of information can support the efficiency and effectiveness of an organisation's transport operations. Information can also help businesses to make informed decisions by presenting data in a way that can be interpreted by management. Access to relevant information resources can support teaching and learning and improve quality sustainable education development in Africa. Designing and improving information infrastructures such as the internet and information centres would facilitate access to information at a low cost in Africa. Improving the skills of information providers through short-term and long-term training would also help users access information easily. Legislations such as Access to Information and others would compel African governments and institutions to reconsider the role of information for sustainable development and consequently use it for decision making and competitive advantage.

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Chapter 5

Improving the Cognitive Development of Children in Rural Areas as Development Tool

Jacob Alhassan Hamidu, Charlisa Afua Brown and Mary Adjepong

Abstract

Good health is a crucial requirement for every child for proper growth and development. To increase their future prospects the exact nutritional intervention is needed to boost the thinking and self-confidence of children. Adequate levels of omega-3 essential fatty acids are vital for children during pregnancy, breastfeeding, and few years post-weaning. This is not just for their perfect growth but including their cognitive development. Poverty levels continue to be high in rural areas and there are nutritional interventions that can be used to reverse the trends. However, omega-3 fatty acids, known to have a greater impact on brain development are not cheap and available in forms that are accessible by the rural poor. With the many complications attached to a rural lifestyle, little is known about culturally accepted local sources of omega-3 fatty acids. Therefore, alternative sources of nutritional intervention including the provision of eggs enriched with appropriate fatty acids, which are readily available, accessible, cheaper, and culturally accepted should be explored for children.

Keywords: Infants, children, rural areas, nutrition, cognitive development, omega-enriched eggs

1. Introduction

Malnutrition is an increasing health problem among children in most developing African countries, especially among rural infants [1]. These young children are most vulnerable due to their high nutritional requirements for growth and development. This is on the backdrop that over 60% of the world population in Africa live in rural areas [2]. In many poor communities in Africa such as Ghana, a severe form of malnutrition called Kwashiorkor is common. Malnutrition is problematic because many children younger than 5 years in rural areas are exposed to multiple challenges including the high poverty situation of parents and unstimulating home environments. This can affect feeding practices. As a result, these children are disadvantaged leading to malnutrition, poor health, and early childhood stunting. These conditions detrimentally affect their cognitive, motor, and social–emotional development. The effects extend into poor cognitive and educational performance.

Children who perform poorly in school, have attention deficit, have poor future prospects, and subsequently have low incomes; as adults, they exhibit poor

cognitive utility living lives below their intellectual capabilities. Attention problems resulting from malnutrition-related challenges persisting to adulthood are an indication of the continuation of poor brain development over the life span of a person. Infantile malnutrition may have long-term effects on attentional processes for over 40 years after its initial establishment. Once established it is difficult to reverse even with excellent long-term nutritional rehabilitation and provision of independent socioeconomic conditions in childhood and adolescence. The challenge with malnutrition, poor cognitive development, and related poverty carry over effects continues to adulthood leading to poor care for children, thus contributing to the intergenerational transmission of poverty and poor standard of living [3–5]. The objective of this chapter is to explore alternative nutritional sources to increase the cognitive development of children in rural areas in Africa, especially Ghana.

2. Factors influencing brain development in children

Historically, higher IQ children are found in urban areas. It has been observed that although both low-income rural and low-income urban children show working memory deficits compared with their high-income counterparts, the low-income urban children exhibited symmetrical verbal and visuospatial working memory deficits compared to their high-income urban counterparts. These results suggest that different types of poverty are associated with different working memory abilities. Memory deficiency is predominately enhanced in rural locations where children are deprived of good nutritional benefits. It is estimated that over 200 million children under 5 years are not fulfilling their developmental potential in south Asia and sub-Saharan Africa, which have more nutritional deficiencies especially in rural areas [6].

For the same level of socioeconomic status in assessing executive functions and non-verbal intelligence performance in 5-year-old children, children in rural settings performed consistently worse than children in urban settings. Both parents' educational level and poverty greatly accounted for poor cognitive functions. In the US lower omega-6 to omega-3 ratios are associated with eating healthy diets in both adults and children. However, adults with a college degree showed much lower ratios than those without a college degree. The situation depicts the impact of knowledge level, financial ability, and exposure to education on eating habits, which are more experienced in parts of Latin America and Sub-Saharan Africa [6, 7]. In China, the urban community setting showed a significant protective effect on cognitive impairment. Cognitive underdevelopment was often prevalent in underprivileged communities and these are poorly addressed in rural settings. It is stated that malnutrition early as far as 3 years has an association with poor cognition at age 11. This prompts the need to promote early childhood nutrition and address factors affecting nutritional choices since they enhance long-term cognitive development and school performance, especially in children with potential for multiple nutritional deficits as may happen in rural areas [8].

2.1 How rural children develop lower cognition level

Cognition is defined as the processes by which an individual processes information through skills of perception, thinking, memory, learning, and attention. There is more evidence that connects improved nutrition and optimal brain function, with studies showing that brain development is faster in the early years of life compared to the rest of the body. The conditional availability of breast milk early in life may account for faster brain development. However, brain development is

affected by quality, timing, and the regional requirement for a particular nutrient at that time in the brain. Nutrients provide building blocks that play a critical role in cell proliferation, DNA synthesis, and neurotransmission, and hormone metabolism. Therefore, children that are malnourished through the mother may be at higher risk [7, 8].

Urban children are taller and heavier than rural counterparts in almost all low-income and middle-income countries. The urban–rural difference is largest in Andean and some central Latin American countries such as Peru, Honduras, Bolivia, and Guatemala. A similar trend in some African countries including Niger, Burundi, and Burkina Faso; and in Vietnam and China. The disparity between urban and rural children's growth is clear with urban children in China, Chile, and Jamaica looking taller than their rural folks. All over the world, the heaviest children live in cities and the most underweight in rural areas. Between 1985 and 2011, the urban advantage in height fell in southern and tropical Latin America and South Asia, but changed little or not at all in most other regions. The urban–rural weight differential also decreased in southern and tropical Latin America, but increased in East and Southeast Asia and worldwide. Overall, the weight gain of urban children outpaced that of rural children [9].

While listing other factors such as poor health care and improved access to affordable stable food and its supply as the major contributing factors to poor cognitive development in rural areas, the quality of nutrition was largely lacking in rural areas. Here, the foods lack adequate amounts of limited nutrients such as proteins, fatty acids, and vitamins. In Ghana, children with the highest levels of total n-3 and docosahexaenoic acid (DHA) were three and four times, respectively, more likely to pass at least one condition of the dimensional change card sort (DCCS) test of executive function than those with the lowest DHA levels. The results of this study indicate an association between n-3 FAs and high-level cognitive processes in children two to six years of age, providing an impetus for further studies into possible interventions to improve essential fatty acids (EFA) status of children in developing countries [10]. The effects of docosahexaenoic acid/omega-3 long-chain essential fatty acid on externalizing behavior are more mixed. Other micronutrients known for their impact on brain development and cognition include zinc, iron, vitamin B, and protein deficiencies, which lead to low IQ and later high antisocial behavior in children. However, the more indicators of malnutrition there is, the greater the antisocial behavior resulting from children. From

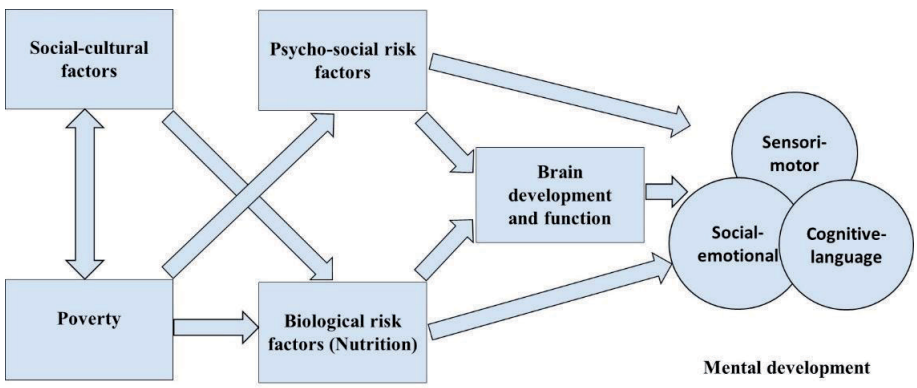

Figure 1.
Nutritional and social factors influencing brain development (Source: Osendarp [11]). Many factors contribute to appropriate development of children and in turn impacts on sensory, social, emotional and cognitive performance of children. However, nutritional factors are easier are easier to address but they must be culturally, economically and socially accepted to make impact in rural communities.

animal and human findings, it is clear that malnutrition impairs neurocognitive functioning by reducing neurons, alternating neurotransmitter functioning, and increasing neurotoxicity. The neurocognitive impairments predispose to externalizing behavior. Poor nutrition contributes to the development of child behavior problems (**Figure 1**) [11–13].

3. Relationship between omega-3 fatty acid and children brain

The growth and development of children is key in developing countries mostly concentrated in sub-Saharan Africa. Rural children are poorly malnourished and this is not only affecting their growth but also cognitive ability. According to Akinwumi Adesina, President of the African Development Bank in the 2017 Global Nutrition Reports, "Nourishing the SDG's", he said "Africa's economic progress is being undermined by hunger, malnutrition and stunting, which cost at least US$25 billion annually in sub-Saharan Africa, and leave a lasting legacy of loss, pain and ruined potential". He continued, "stunted children today lead to stunted economies tomorrow". Hence poor health of children both born and unborn can have strong implications on personal and national growth. The causes of malnutrition are in parts directly related to inadequate dietary intake. Other factors include diseases, household food security, maternal and childcare, health services, and the environment. While most nutrition interventions are delivered through the health sector, non-health interventions such as appropriate dietary or nutrient type can also be critical. Actions should target the different causes to reach sustainable change, which requires a multi-sectoral approach [14].

Adequate levels of omega-3 essential fatty acids are vital before conception, during pregnancy, and during breastfeeding to ensure a perfect start to life. Mothers need to produce not just enough vital DHA and EPA for themselves and their own body but also enough for the new life and vital organs of their baby too, particularly the brain, nervous system, and eyes. Omega-3 long-chain polyunsaturated fatty acids have been observed as important constituents of young and maturing brain cells of children and therefore are considered crucial for brain development in utero and early infancy. In children older than 2 years of age, epidemiological evidence suggests an association between psychiatric or neurodevelopmental disorders and omega-3 fatty acid deficiencies. In neonates, a deficiency is associated with visual impairment, abnormalities in the electroretinogram, and delayed cognitive development [10, 15, 16].

There are three types of omega 3 fatty acids (alpha-linolenic acid (ALA), eicosapentaenoic (EPA) acid, and docosahexaenoic acid (DHA), each of which is needed in the human diet because of their unique beneficial qualities on health and brain development in children. The ALA is carried by plants and is efficiently converted to the EPA in human tissues. The capacity to up-regulate ALA conversion to DHA in women is assumed important for meeting the demands of the fetus and neonate during pregnancy [17]. However, most pregnant women and children in rural areas may not be getting enough omega-3 fatty acids because the major dietary source that contains n-3, which is seafood is not available. Seafood is restricted to coastal areas. On the part of rural people, their purchasing power restricts them to less seafood and in urban areas, the major restriction is two servings a week. These fatty acids are especially critical during pregnancy for the development of the baby's brain, nervous system, and retinas. Studies have shown that pregnant women whose diets were higher in docosahexaenoic acid had offspring with higher IQ scores while infants who did not get enough omega-3 fatty acids from their mothers during pregnancy are reported to be at risk of developing vision and nerve

problems. Children with attention-deficit/hyperactivity disorder (ADHD) may have low levels of certain essential fatty acids (including EPA and DHA) [18]. In a clinical study of nearly 100 boys, those with lower levels of omega-3 fatty acids had more learning and behavioral problems (such as temper tantrums and sleep disturbances) in comparison with boys with normal omega-3 fatty acid levels. All these are possible because omega-3 fatty acids improve metabolic responses such as low-density-lipoprotein (LDL) oxidations of blood glucose and these have direct functions on the brain [19].

3.1 Omega3 fatty acids intake of children in Africa and Ghana

Omega-6 and omega-3 fatty acids (FAs) and their ratio have been shown to affect cognitive function in children and older adults. It is expected that most children would consume at least the recommended amount of alpha-linolenic acid (ALA; omega-3) for their age and gender without consuming high amounts of linoleic acid (LA; omega-6). However, children often do not consume sufficient eicosapentaenoic acid (EPA; omega-3) and docosahexaenoic acid (DHA; omega-3), which form the bulk of the directly usable form of omega-3 fatty acids needed for brain development. Currently, it is not stated what the daily intake of omega-3 FA is in a typical African population by country but there are spatial data for certain locations. However, in developed countries, there are data to show intake. The average American consumes about 1.6 grams of omega-3 FA daily and about 1.4 grams of this comes from ALA, while 0.1-0.2 grams from EPA and DHA. Additionally, the American Heart Association recommends that healthy adults eat fish at least twice weekly because of the large amounts of omega-3 FA. The World Health Organization (WHO) also recommends a daily EPA and DHA intake of 0.3-0.5 grams and a daily ALA intake of 0.8-1.1 grams [20].

The overall omega-3 fatty acid intake of children in three different geographical communities in South Africa has shown that daily intakes are low in children from all communities studied. The median combined intake of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) was 50, 55, and 3 mg a day in the 3 communities, which are very far below the typical recommended intake between 100 and 200 mg per day for children from 2 to 6 years. It is general to see higher consumption levels of omega-6 fatty acids rather, which is known to suppress endogenous production of EPA and DHA from ALA (alpha-linolenic acid). In Ghana pregnant and nursing mothers often consume a lot of melon seeds (Neri and Egushi) with the sole aim of increasing their breast yield and quality. However, it has been demonstrated that the two seeds rather contain higher levels of omega-6 fatty acids and non-existent levels of omega-3 fatty acids. The largest nutritional benefit derived from the seeds is the higher content of amino acids, which could increase children's general development but may not have a greater impact on cognitive development [21–23].

In the Gambia, omega-3 intake of children below 36 months was as low as 140 mg per day compared to children in Britain. However, there was no variation in the omega-6 intake. Additionally, the growth of children by body weight in Britain was superior from infancy to 36 months compared to children in the Gambia, emphasizing a deficiency in omega-3 fatty acids in supporting children's growth and development both maternally and after weaning up to 36 months in a typical developing country. In several other Africa countries including Nigeria, Congo, South Africa, Burkina Faso, and Egypt there is evidence of lower maternal milk omega-3 levels, which appears to emphasize generally the lower omega-3 intake in children chronicled so far. The lower omega-3 intake is reflected in the diets taken by these people, which have higher amounts of omega-6 rather than omega-3 fatty acids [24].

In Ghana especially Northern Ghana, often characterized by increased poverty, the diets of children are mainly from cereals and fruits, with the intake of fats and proteins below adequate levels. In characterizing for whole-blood fatty acids levels of Northern Ghanaian children, specifically at Savelugu-Nanton district and to assess the association between FA levels and growth parameters, it was reported that a high level of Mead acid levels, a type of omega-9 fatty acids was evidence of essential fatty acids deficiency. Besides, the level of stunting in children was as high as 29%. This high level of stunting was also noticed along with significantly low DHA, total n-3, and the omega-3 index in stunted children compared to non-stunted children [25]. In a similar study, with children in southern Ghana of the same age, residing in communities in the Upper Manya Krobo district the blood omega-3 FA levels were rather significantly higher while omega-6 FA levels were lower compared to the previous study [26].

The mean level of DHA and the omega-3 index, for example, were 2.62% and 4.55%, respectively in the northern Ghana population compared to 5.09% and 8.03% in the southern Ghana population. Similar to the Mead acid level, this was lower indicating a lower EFAD compared to the Northern children. The disparity was due to this community's high consumption of fish and seafood compared to Northern Ghana children accounting for lower stunting. The proximity of the southern population to a fishing community could have accounted for the availability of fish as the major supplier of omega-3 FA rather than affordability, with both indicators being problematic in most rural communities. It appears there is a higher rate of EFA deficiency in the northern compared to the southern children. Comparative observation showed the southern children in this location also described as a fishing community had similar or higher omega-3 index than children in some developed countries. It is therefore clear from the two types of research that children in northern Ghana and by extension children in rural communities located far away from fishing vicinities were more at risk of not meeting their omega-3 FA need. Therefore, any intervention project should well focused on where there is a need for omega-3 FA supplementation. Since the above studies did not correlate the omega-3 measurements to cognition, a more detailed data collection of such a relationship was recommended [25, 26].

3.2 Bridging the gap in omega-3 fatty acids intake in children

Marine fish such as mackerel, salmon, sardine, herring, and smelt, both fresh and dry are excellent sources of EPA and DHA and influences the total available omega-3 fatty acids in diets greatly. Similarly, plant seeds and oils such as flaxseed oil, perilla oil, canola oil, soybean oil are good sources of omega-3 fatty acids, especially ALA but most of these seed/oils are not tropically available and therefore are not known in rural areas of most African countries. Sources such as Soybeans, sunflower, and palm oils contain varying quantities of omega-3 fatty acids but have large quantities of omega-6 fatty acids [27].

In Urban areas, there are fish capsules available in stores that could be taken to provide children with omega-3 FA and increase development. However, per some assumptions, rural people and people living in most developing countries will less likely accept capsule supplements due to various beliefs and cultural systems. It must be noted that the above sources of omega-3 FA are only given to children when they above 2 years in most cases. Therefore, providing omega-3 FA in eggs has been proposed in various circles as an alternative to fish sources. This is because they will find it to be more natural as they may not think about the deep scientific work done in incorporating the omega-3 FA into the eggs but they will know that egg is produced when feed is given to chickens and this is a natural process of producing

eggs [28]. In developing countries, it is always the norm to increase food intake in rural areas and not necessarily food quality. However, concerns are rift on the quality of food because the levels of omega-6 FA are usually high in Africa foods. Therefore, new approaches to developing quality intake are long overdue. The idea in this chapter includes the exploration of the nutritional enrichment of eggs with omega-3 fatty acids, which will be largely accepted by rural folks. Even in a developed country like the USA, it has been observed that overall, omega-3 fatty acids intake as supplements was low among individuals with lower educational attainment and income levels. Many people were also at higher risk of lower omega-3 fatty acids supplements and fish intake with people in such disadvantaged positions [28]. This could be worse in rural areas of Africa where the family fish is rationed during meals. While supplemental use increased EPA + DHA intake only 7.4% of individuals consistently took the supplements. Additionally, daily supplementation of ≥450 mg DHA + EPA per day increased omega-3 index to >6%, which is described as a more likely show of efficacy on cognition in children and adolescents [29]. The Omega-3 index assesses the omega-3 status by analyzing the erythrocyte fatty acids, at least longer-term intakes over approximately the previous 120 days. This omega-3 index was proposed by Harris and von Schacky to reflect the content of EPA + DHA in erythrocyte membranes expressed as a percentage of total erythrocyte fatty acids [30].

3.3 Omega-3 eggs enrichment efforts in Ghana and Africa

The assembling on a least-cost basis a poultry layer diet with the inclusion of omega-3-fatty acid source has been explored at the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, to produce eggs, which will be cheaper than other sources of omega-3 fatty acid sources in increasing the brain development of children in rural areas and sustain healthy living. Between 2014 and 2016, this study was successfully conducted in Ghana with the incorporation of omega-3 fatty acids in eggs through the diets of laying chickens in Ghana, the first in the Sub-Saharan Africa region. The Grand Challenges Canada, saving brains grant for research, supported this proof of concept. The technique was accomplished through poultry production techniques of feeding poultry diet formulated with the inclusion of flaxseed oil, a concentrated source of the omega-3 fatty acids group called ALA, which appreciably can be converted to EPA and DHA in infants that are easily usable by the body [31]. The eventual fatty acids deposited in the eggs were analyzed and proven with laboratory procedures through gas chromatography technology. Upon completion of the research, it was realized that the control diet which did not contain flaxseed because of the inclusion of fishmeal in the diet contained 466 mg per 50 g egg while the 3% flaxseed oil inclusion in poultry diet treatment together with some fishmeal yielded 1,206 mg omega-3 fatty acids per 50 g egg. Considering that, the research yielded more omega-3 fatty acids even with the control diet there is a lot of progress made in ensuring adequate nutrition for rural children. The idea is on the premise that the amount of omega-3 varies with the number of foods containing omega-3 s that are eaten by hens but must be bioavailable to humans. The target is to make these eggs available in rural areas. Interestingly, in this study, there was a high yield of ALA compared to EPA and DHA. In children above 2 years, it is understood that the conversion rate of ALA to EPA is moderate but very limited to DHA. However, the higher the level of ALA and lower the level of LA, the increase in the conversion of ALA into EPA or DHA, with the conversion more dependent on absolute amounts but not their ratio [32]. Interestingly, there is evidence that the local, indigenous people of Africa seemed to have retained the genetic ability to activate the necessary dehydrogenase and elongation enzymes

to make EPA and DHA from the readily available ALA substrate, which makes the above study a potential solution to the omega-3 FA deficiency for Ghanaian and Africa children [33].

4. Eggs as alternative carrier of omega-3-fatty acids in rural areas

The egg is one of the cherished sources of nutrients in human food and it plays a vital role in a healthy life. It has low-calorie content and supplies most nutrients including proteins when consumed. A 60 g egg contains 61.5% (36.9 g) albumen, 29% (17.4 g) yolk and 9.5% (5.6 g) shell. A 60 g chicken egg contains about 5.5 to 6 g lipids, which is found in the egg yolk [34]. The fatty acid profile of a hen's egg shows that 44% of the lipids in eggs are MUFA, followed by 29% saturated fatty acid and 11% PUFA [35]. Conventional hen diets result in eggs with a n:6: n:3 ratio of about 13:1, much higher than recommended for optimal health [36]. However, an enriched egg can provide upwards of 500 mg total n:3 PUFA, which may contain up to 290 mg of combined EPA and DHA. Both n:3 and conventional eggs contain the same amount of energy, protein, saturated fat, and monounsaturated fats but the n:3 eggs contain more LA, AA, ALA, DHA when compared with conventional eggs. On average, a commercially available n:3-enriched egg contains about 75 mg DHA for an egg from a flax-fed hen, and 125 mg DHA from a hen fed both flaxseed and fish oil (**Table 1**) [37].

A fortified egg has the unique advantage of combining almost all the primary nutrients from animals for humans. These include innately providing the highest quality protein and amino acid proportions, fats and essential fatty acids, vitamins, and minerals. Eggs also have a unique capacity to concentrate added essential nutrients and phytonutrients and effectively deliver them with high bioavailability [19]. Additionally, eggs are highly acceptable among rural folks and therefore its substitution for nutrients supplements for children is highly recommended. Besides

Nutrient	N:3 Egg	Conventional Egg2
Energy (calories)	70	70
Protein (g)	6	6
Total fat (g)	5.0	5.0
Saturated fat (g)	1.5	1.5
Monosaturated fat (g)	2.0	2.0
Total n:6 fatty acids(g)	0.8	0.6
Linoleic acid(mg)	6405	540
Arachidonic acid(mg)	305	80
Total n:3 fatty acid (g)	0.43	0.1
Alpha-linoleic acid (mg)	1745	31
Eicosapentanoic acid (mg)	175	1
Docosapentanoic acid (mg)	105	4
Docosahexanoic acid (mg)	1085	344
Cholesterol (mg)	195	195

Source: Gillingham et al. [12].

Table 1.
Nutrient content of enriched and conventional eggs.

eggs are cheaper sources of concentrated nutrients. In the past, the WHO has recognized the need to improve the process by which health-related recommendations are developed including nutrition using the best available evidence. With this, the WHO Nutrition Guidance Expert Advisory Group was formed with experts from WHO Advisory Panels and other experts in the fields of epidemiology, nutrition, public health, pediatric medicine, and program implementation. We recognize that nutritional cognitive development innovation should provide a solution for children and must follow proper guidelines [38]. An additional proposal from the WHO includes adopting priority nutrition outcomes such as complementary feeding counseling and active feeding, growth monitoring and promotion, and supplementary feeding or food-based interventions. That is why we have spent the time to provide proof that it is possible to intervene in cognitive retardation with nutritionally fortify eggs, which will complete the protein and other essential nutrients in supporting children's development. This is because the special functions of the brain are reflected in a higher need for nutrients such as choline, folic acid, iron, zinc, and special fats (e.g. gangliosides, sphingolipids, and docosahexaenoic acid (DHA)) and we emphasize the essential fatty acids. For eggs enriched with omega-3 fatty acids, the health advantages include high antioxidants levels, due to high n-9 monounsaturated fatty acids (MUFA) or n-3 polyunsaturated fatty acids (PUFA), with lowered n-6 PUFA, and n-6: n-3 ratio over regular eggs [8].

4.1 How much omega-3 is required by children through eggs

For children between 6 months to 8 years the total ALA omega-3 fatty acids need is between 0.5 g to 0.9 g per day [39]. In the research at KNUST, a 50 g egg enriched with 3% flaxseed oil provides 1.2 g of the total omega-3 per day with a high level of ALA in addition to EPA and DHA. Besides, the majority of the omega-3 fatty acids contain other types of omega-3 fatty acid eggs that are readily available for direct utilization by children for improved health using the enrichment procedure adopted, compared to available enrichment procedures that use only flaxseed or algae that enriches mostly ALA. Increasing omega-3 eggs intake of this local enrichment intake for a period of weeks to months could result in an increase in the proportion of eicosapentaenoic acid (EPA; 20:5n-3) in plasma lipids, in erythrocytes, leukocytes, platelets in children and in breast milk with potential to increase newborn health [40].

Protein intake combines with omega-3 FA intake for child growth and development. An average egg contains about 6–7 grams of proteins. However, the protein content depends on egg size. The average protein requirement for a child's development ranges from 1.12 g/kg/day at age 6 months to 0.74 g/kg/day at 10 years, with a small decline towards the adult value thereafter. The corresponding values for the safe level are 1.43 g/kg/day at 6 months and 0.91 g/kg/day at 10 years. These values show that just one 50 g egg a day will provide over 5 g more protein for a child per day [41]. This means eggs contain so much protein for a child's development and is a cheaper source of protein. So just one egg in 5 days is far enough and village people can afford this. So considering the wastage of protein/omega-3 in the human metabolism pathway, one egg for 2 days at most is sufficient for a child's development if other sources are excluded. Out of 43 countries in sub-Saharan Africa, only nine countries have an average consumption of eggs that is higher than 2 kg while in most of Asia and the Americas, people eat at least twice that amount, and in Japan, it is 19.1 kg. Expanding the poultry business using eggs will increase production because consumer perception will change. The potential increase in egg intake will greatly affect the egg value chain (grain producers, hatcheries, feed manufacturers, poultry farmers, veterinary stores, and egg sellers). This happened

in South Africa in 2010; an increase in egg consumption led to higher prices, production, and jobs [42].

In 2015, the MDGs expired, yet average nutritional problems in Ghana were still high with about 20% of children being stunted, 9% is wasted and 14% being underweight. The approaches used in the MDGs included vaccinations, NGO interventions, and aids. However, Ghana did not appear to achieve MDG 4 (reducing child mortality at end of 2015) due mostly to hunger and poor nutrition (MDG 3). According to the World Food Programme, eradicating hunger and malnutrition is one of the great challenges of our time, and not having enough – or the wrong food causes suffering and poor health, as well slows progress in education and employment.

The project of enriching eggs with omega-3 FA has the potential to meet the now SDGs 1 to 5 including no poverty, zero hunger, good health, and well-being, quality education, and gender equality respectively in very vulnerable people in our society especially women and children (unborn and children under 5 years). There is considerable evidence that the DHA content of the maternal diet is the most important determinant of the amount of DHA secreted in milk, which increases children's health. Therefore, it is no surprise that infants fed a DHA-fortified formula have better eyesight than infants fed a formula without it. However, these nutrient supplements are not available to rural parents and make them a vulnerable population. The greater portion of the diets of rural people in Ghana similar to the Western population contains greater amounts of omega-6 fatty acids (oil palm, starchy foods, overcooked vegetables) leading to poor health [43]. By eating eggs especially the omega-3 fortified eggs it will also give them a good balance of omega 3 to 6 ratio. With the focus on children, and women living in rural areas there is a greater potential to provide quality nutrition and health care.

4.2 Omega-3 egg impacts the egg value chain in Africa

The idea of developing the omega-3 eggs through the feed of poultry layers will expand the egg value chain. This includes enhancement of the activities of operators of breeder farmers (layer breeder flocks to produce fertile eggs for a hatchery), hatcheries, commercial egg producers (have layer flocks to produce table eggs), egg marketers, feed millers and feed processors, or feed ingredient dealers and primary crop farmers, veterinary drug dealers and consumers of the eggs. Eggs are also useful to many households, especially rural communities that have bigger malnutrition challenges. In Ghana specifically, the Government school feeding program, free senior high school program, and various public institutions including hospitals need eggs as higher immune booster especially with the COVID 19 pandemic where patients need to eat good quality food to increase their immune system. The omega-3 egg value chain can address the marketing challenges of egg farmers and increase its intake in the whole Sub-Saharan Africa Region and Africa.

NB: It can be noted from the **Table 1** above that both omega-3 enriched eggs and conventional eggs have the same amount of energy, protein, total fatty acids, saturated fatty acids, monosaturated fatty acids and cholesterol. These components of the egg are responsible for energy and protein to enhance growth of children, but may not necessarily increase brain development to increased cognition and future prospects of children. Children need not only to grow but must undergo the proper physiological and psychological developments to make them contribute positively to societal development. The enhancement of cognition and its mechanism of brain function has not being studied very well from the egg nutrient point of view. Since omega-3 fatty acids and the omega-3:omega-6 fatty ratio are known to increase brain development they should be well explored. It can enhance cognition and by

extension development of children. The most impact can be experienced in rural communities. The enrichment of eggs in this instance, which leads to increased omega-fatty acids and it major components ALA, EPA, DHA and LA by larger folds is a cheaper alternative to increased brain development, child development and cognition development in rural communities. The production of omega-3 fatty acids eggs is a much cheaper, convenience and culturally accepted method compared to medical administration of omega-3 fatty acids supplements to children to increase development.

5. Conclusions

Omega-3 enriched eggs is proposed to supplement the diets of school-going children below age 6. Additionally, embarking on a public health campaign on the health benefits of eggs, engaging governments to use innovative methods to engage stakeholder to increase the intake of eggs for nutritional improvement of children in rural areas. The prospects of the omega-3 fatty acids include increasing academic performance and future prospects of rural children. In addition to the above, increased production and consumption of eggs, especially with the branding of eggs through omega-3 fatty acids fortifications in the developing countries will increase food and nutrition security, and the development of children in rural areas. Besides, eggs are inexpensive source of high-quality protein, essential vitamins, and minerals that are needed for a healthy diet and a healthy life and important for the nutrition of growing children, as well as being culturally acceptable. The current suggestion could increase business, create jobs within the egg value chain, and open opportunities for all stakeholders in health, agriculture, government, and philanthropic organizations, and be used as a tool for increasing rural development.

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Conflict of interest

The authors declare no conflict of interest.

Notes/thanks/other declarations

Aims of the chapter

This chapter shows how infants and children below 5 years are disadvantaged in rural areas. They are also deprived of appropriate and adequate nutrition. This affects their wellbeing, cognitive development and future prospects. The chapter is a form of communication to opinion leaders and stakeholders to address the long-term effect of infant nutrition in rural areas, especially in Sub-Sahara Africa on cognition and how this lingers on into adult life. Moreover, to be useful, the chapter advocates adequate nutritious food, which is eggs and presents a calculated

strategy with research proven omega-3 fortified eggs to reverse memory deficits in children during pregnancy and in breast feeding children. Therefore, the ability to perform excellently in children from rural communities will depend on traditionally approved and acceptable nutritional strategies, which can increase sustainable livelihoods in rural communities. The book chapter is a suggested solution to malnutrition, poverty reduction and livelihoods improvement as sustainable development plan to solving malnutrition in rural children.

Key points

In this book chapter there is strong demonstration that:

By enriching the diet of layer birds with 3% flaxseed oil, there is an increase in specific fatty acids that make up omega-3 and omega-6 fatty acids, resulting in eggs high in omega-3 fatty acids.

Total omega-3 fatty acids were 2.54 times higher in the 3% flaxseed oil eggs than the 0% flaxseed oil eggs. However, the feed cost in producing omega-3 eggs by incorporating 3% flaxseed oil was also 2.25 times higher.

In terms of taste, acceptability, smell of the yolk and texture of the egg yolk, the taste panelist did not notice any difference between the flaxseed oil eggs and the fishmeal eggs, or those with no flaxseed oil included in the diet.

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Chapter 6

Rural Development on the Agricultural Institution Basis: Case of the Agricultural Development in Bali Province, Indonesia

Gede Sedana

Abstract

Presently, agricultural sector has great role in supporting and accelerating economic development in the developing countries. Development of agriculture is always related to the rural development since it is an integral part to rural economic development. Therefore, the agricultural and rural development should be designed to increase the productivity of land, crops, and human resources in order to improve the welfare of rural village. The implementation of agricultural and rural development should be done by involving the rural institutions. Several problems have still found in the agricultural and rural development that should be properly managed by considering various aspects. In Bali Province, the implementation of agricultural and rural development can be conducted to develop tourism, industry, environment, and other economic activities. The agro-tourism, agro-industry, integrated farming system (system of crops and livestock) and village-owned enterprises could be developed as a response of the rural development.

Keywords: Agriculture, development, rural, productivity, tourism

1. Introduction

In the developing countries, agricultural sector is still very important to support and accelerate the economic development [1]. Most of the agricultural areas are located in rural areas. So that it is often identified that rural development is also agricultural development. Natural resources and human resources in rural areas have great potential to be developed in the agricultural sector. Land and water are the main natural resources in rural areas and are used for farm management by rural residents who mostly work in the agricultural sector. Therefore, the management of natural and human resources is the key to success in the realization of the goals of agricultural and rural development. Of course, this success needs to be supported by various government policies and other related institutions that are able to encourage the available human resources in rural areas.

The introduction and development of both physical and non-physical technologies are also being the important components in agricultural and rural development. Most of the economic development in developing countries has agricultural and rural development designed to increase the productivity of land and human

resources in order to improve the lives of their people. Rural development is an integral part of economic development in Indonesia which aims to improve the social and economic welfare of citizens, particularly those who are relatively poor. Conceptually, rural development is planned and implemented in a comprehensive and multidimensional manner by the government together with rural communities. The rural development plan can include aspects of agriculture, rural industries, tourism, household handicrafts and small industries, and infrastructure development that support socio-economic activities. In addition, rural development also includes community services and facilities, human resource development in rural areas. The agricultural sector clearly cannot stand alone because it has strong links with the manufacturing sector, service industry and other sectors. Thus, the progress of the agricultural sector is influenced by various policies from the non-agricultural sector.

Presently, agricultural development in the developing countries, including in Indonesia has significant role in the economic development which produces food, provides employment and generates income especially for rural development [2, 3]. Agricultural development that is currently being carried out has not shown maximum results due to various factors. Several research results indicate that the limited mastery and use of agricultural technology has resulted in relatively low productivity [4, 5]. The intended agricultural technology is the application of seeds, seeds, fertilizers, pesticides, plant and livestock cultivation and post-harvest methods. Apart from low productivity, the products produced by farmers are also of low quality. As a consequence of this condition, they get an inadequate price level for the products they produce. Another influencing factor is the relatively narrow ownership of agricultural land. Narrow land is considered inefficient in commercial and professional rice farm management. Some of the issues that often occur in Indonesia including Bali province regarding agricultural and rural development are poverty, technology and others as presented in **Table 1**.

Agricultural and rural development in Indonesia includes various aspects of life and the environment. This development not only involves the ministry of agriculture but also other relevant ministries, such as the Ministry of Villages, the Ministry of Public Works, the Ministry of Tourism, the Ministry of Transportation and others. Therefore, there is a need for synergy and coordination between ministries in order to realize the goals of agricultural and rural development. Bali is one of 34 provinces in Indonesia still rely on the agricultural sector in economic development in addition to the tourism sector. It is hoped that the high rate of tourism development growth will not destroy the existence of the agricultural sector in Bali. The farming culture is one of the pillars of Balinese culture which is also a tourist attraction. Therefore, it is necessary to have various alternative efforts to develop agriculture and rural areas in order to improve community welfare and reduce rural poverty.

In general, the agricultural and rural development in Bali province can be carried out by taking into account the aspects of tourism, industry, environment, and small-scale economy at the village level. Bali is a small island which has been acknowledged as the tourism island in Indonesia. Its location can be seen in the **Figure 1**. Development related to tourism will be described by presenting the development of agro-tourism in rural areas. In the industrial aspect, agricultural and rural development can be carried out through agro-industrial development. The environment aspect relates to the integrated farming system, such as the integrated system of crops and livestock carried out in the farm area. Meanwhile, the formation and development of village-owned enterprises is a part of development that deals with the economic aspect on a small scale.

Rural issues	Agricultural issues
1. Poverty	1. Poverty
2. Unemployment	2. Low productivity
3. Disparity of income	3. Limited quality of human resources
4. Limited access to information,	4. Limited agricultural technology
5. Communication and technology	5. Lack of capital
6. Limited access to physical infrastructure	6. Limited infrastructure to support agriculture development
7. Low capacity of rural people	7. Market of agricultural product
8. Lack of investment	8. Failure of harvest (pest and disease attack, climate)
	9. Land conversion
	10. High tax of agricultural land

Source: Analysis of secondary literatures, 2020.

Table 1.
Rural and agricultural development issues.

Figure 1.
Location of Bali Island. Source: peta indonesia peta indonesia 2015 peta indonesia vector peta 2 bp - Peta Indonesia Full HD (jackofftococock.blogspot.com).

2. Agricultural and rural development through Agro-tourism

Bali as an international tourism destination provides great opportunities for the development of the agricultural sector with regard to tourism good and services. The potential of the agricultural sector in Bali is a beautiful terraced rice field landscape, attractive farming culture, coffee plantation areas, flower garden areas, horticultural areas and various other commodities. Agriculture-based tourism activities are agro-tourism and ecotourism. One of the most famous agro-tourism areas is the Jatiluwih area in Tabanan Regency, which is in a mountainous area. This area is a world cultural heritage given by UNESCO in 2012. In Bali, irrigation management in rice fields is fully carried out by s*ubak* as a farmer organization. *Subak* is also a traditional irrigation system in Bali which has a philosophy called *tri hita karana* [6–8]. The three components are based on the harmonious relationship, namely the relationship between farmers and God (*parhyangan*), the relationship between farmers and other farmers (*pawongan*), and the relationship between farmers and their environment (*palemahan*). This *subak* philosophy serves as a guideline for members and administrators of the *subak* in managing rice farming and other crops farming on the rice field [9, 10].

In an effort to support rural development through agricultural activities, it is necessary to strengthen and intensify *subak*s activities in rural areas regarding economic business. Strengthening the *subak* includes the provision of irrigation infrastructure, provision of agricultural inputs and agricultural tools or machines, agricultural extension and training on good agricultural practices, post-harvest processing, and good manufacture practices, and marketing of agricultural products. These activities and the potential of *subak* area and culture could support the establishment and development of agro-tourism in the rural area.

Agro-tourism development can be an option in rural development because most of the area is for agricultural activities. Agro-tourism means a business that combines agricultural activities with tourism, where tourists can gain farming experience according to existing farming. In addition, agro-tourism is also expected to provide additional income for farmers from agricultural activities enjoyed by tourists. The agro-tourism is any activity in which a visitor to the farm or other agricultural setting contemplates the farm landscape or participates in an agricultural process for recreation or leisure purposes [11]. Or in other words, agro-tourism is a tourist travel activity that uses agriculture as an attraction, such as landscape, land topography, types of plants, agricultural products, agricultural culture and other social activities. Agro-tourism can be said to be agriculture-based tourism because its activities are oriented to agricultural aspects, and can also be identified with agricultural tourism in rural areas.

The potential for developing agro-tourism in rural areas across Bali is very varied. Rice fields with their agricultural culture, such as the management of traditional irrigation systems, provide specific attraction for tourists. A very famous agro-tourism area in Bali's rice fields is Jatiluwih agro-tourism. In this area, tourists can enjoy terraced rice fields which are located in a mountainous area or at the foot of Mount Batukaru, Tabanan Regency (see **Figure 2**).

Apart from the terraced rice fields, the Jatiluwih Agro-tourism area has also been recognized by UNESCO as a world cultural heritage since 2012. The designation of *subak*s in the Jatiluwih area as a world cultural heritage was carried out under the label of Cultural Landscape of Bali Province: the Subak System as a Manifestation of the Tri Hita Karana Philosophy. As cited above, *tri hita karana* is a Hindu philosophy which is being a social capital for the *subak*. *Tri hita karana* has become a binding for all members and administrators of the *subak* in carrying out activities related to agriculture, irrigation and other social activities. The recognition as cultural heritage has significantly contributed to the agro-tourism development in Jatiluwih area. The beautiful rice field landscape becomes more famous in the world after the recognition. This is indicated by the number of tourists had been increased since 2011 to 2018, that is, 45,774 persons to 277,973 persons (see **Table 2**).

Seeing **Table 2**, it is informed that the international visitor is bigger than the domestic one every year. This means that agro-tourism of Jatiluwih has been known well in the world. This is real big potential to be developed by the *subak*s, village and local government (at the district and provincial levels).

In this area, there are 14 *subak*s covering an area of around 2,472 ha. In an effort to preserve cultural heritage and at the same time improve the welfare of rural farmers, several efforts are required at the *subak* and village levels based on the potential of natural resources and human resources as well as farming culture. The concept that should be implemented for making better agro-tourism development in the Jatiluwih area are concerned the attraction, accessibility, amenities and ancillary. As an attraction aspect, the beautiful landscape of *subak*s should be kept by the farmers by applying good agricultural practices while sustaining the farming culture. The visitors could enjoy the landscape of terraced rice field and learn how to plant, land cultivation by using cattle, and other farming activities. They could also have good interaction with the local farmers while walking around the terraced rice field.

Figure 2.
Jatiluwih agro-tourism. Source: Documentation of Sedana, 2020.

No	Year	Visitor (person)		Total (person)	Increased (person)	Increased (%)
		Domestic	International			
1	2010	161	39,807	39,968	-	-
2	2011	326	45,448	45,774	5,806	14.53
3	2012	1,653	62,197	63,850	18,076	39.49
4	2013	5,607	95,958	101,565	37,715	59.07
5	2014	17,470	147,574	165,144	63,579	62.6
6	2015	21,429	142,937	164,366	−778	−0.47
7	2016	24,241	185,268	213,509	49,143	29.9
8	2017	39,505	211,288	250,973	37,646	17.55
9	2018	49,380	227,804	277,973	26,216	10.45

Source: Management Board of Jatiluwih Tourism Destination, 2019.

Table 2.
Number of visitors to Agro-tourism of Jatiluwih.

Another specific activity offered by *subak*s relating to agro-tourism is ritual ceremonies as one of the cultural landscapes. In a rice planting season, there is 15 kinds of ritual ceremonies performed by the *subak*. It is started from the ritual ceremony for irrigation water fetching which is carried out in the temple near the weir/dam. The latest ritual ceremony is in the event of post-harvest activity that is keeping rice at the granary. These ritual ceremonies could be attracted the visitors to know and learn about the procession and functions. In the relation to ritual ceremonies, there are many temples scattered in the area of *subak* which belong to individual farmer as well as *subak* (see **Figure 3**). The role of women is very important for the ritual ceremonies' activities performed at the *subak* level. They prepare offering together by using local materials gained from their farm, such as fruit, banana leaf, flowers, coconut and other agricultural products. These ritual ceremonies could be an attraction for the visitors.

Figure 3.
One of the temples in Jatiluwih area. Source: Documentation of Sedana, 2020.

Accessibility to the Jatiluwih agro-tourism area is relatively good by using transportation modes according to the standard needs of tourists. However, some sections of the road are narrow in size due to their location in the mountainous area. Small vehicles can be used to make it easier to enter the agro-tourism area. In addition, the availability of the internet network is also very good to facilitate communication for tourists.

Other facilities that are also well available to tourists are health facilities, clean water, electricity, and financial transactions. The local government together with the village has built networks and installations so that tourists do not have difficulty obtaining services. Local residents also provide lodging services for tourists in the form of villas, and home stays. Therefore, the community can get additional income from non-agricultural activities. Another service available in the agro-tourism area is traditional culinary delight which is one of the main attractions for tourists.

3. Building agro-industry in driving rural industrialization

In the agribusiness system, agro-industry is one of the sub-systems which together with other sub-systems form the agribusiness system. The agribusiness system consists of the input sub-system (upstream agro-industry), farming (agriculture), output (downstream agro-industry), marketing and support. Thus the discussion about agro-industry cannot be separated from the development of agribusiness as a whole. Agro-industrial development in Indonesia is a must in order to lead to an agricultural-based industrial society. This is due to the fact that the majority of rural communities depend on the agricultural sector, there is an imbalance between cities and villages, so that urbanization is quite high and income levels are low, and unemployment is still high.

On the other hand, activities in the agricultural sector (on farm) are currently a source of income for most rural communities, but have not been able to provide a decent life because the added value of on-farm activities is very small. This is due, among others, to the inability of agricultural products to respond to changing demands of today's consumers who demand high quality, continuity of supply, on time delivery, and competitive prices. Processing of agricultural products is still very limited because farmers sell them in the form of raw materials.

Agro-industrial development will be able to increase added value through processed products and improve the quality of its products. Furthermore, this condition can increase the demand for agricultural products, thereby increasing production, prices for agricultural products and farmers' income. The development of the agricultural sector will increase the demand for the upstream agro-industry sector, the marketing sector and the supporting sectors (finance, insurance, consulting and education). Thus the development of the agro-industry sector has a large multiplier effect.

Development of agro-industry is expected to drive rural industrialization on the basis of agriculture. For instance, fermented coffee processing industry in the villages within Bali province has several roles in supporting rural development. This processing industry is able to transform a comparative advantage into a competitive advantage of coffee production. The industry could provide value added which in turn strengthens the competitiveness of Bali agribusiness product. Apart from coffee, Bali has several superior commodities, namely cocoa, cloves, vanilla, oranges, cashews, mangosteen, snake fruit, grapes and food products. The private sector and government should more intensively involve in the investment on the agro-industry. Development of rural industry also gives contribution to create larger market of agricultural products. Having industry in the village, it could have a local raw material produced by the agricultural sector. This means that there is a mutually beneficial and mutually beneficial relationship between the agricultural and industrial sectors, both in the upstream and downstream industries. Or in other words, rural development will increasingly grow with the industrial sector as the driving force and support the growth of rural economy.

Infrastructure development program is needed to support agro-industrial development in the village and inter villages. Transportation conditions in rural areas in Indonesia including in Bali should be well constructed and connected to the other areas. The distance between villages is relatively far and difficult to reach each other so that accessibility is low. The availability of physical infrastructure is one of the important components in developing agriculture and rural areas. The rural infrastructure intended is the transportation infrastructure (roads) that connect to the centers of city, sub-districts, and villages, reach the agricultural production centers and other locations of economic activity. Good transportation conditions are one of the main requirements in developing agriculture. Roads in the village and which are connected to the sub-district and city centers provide easy accessibility and smooth transportation of input and product for farmers, other market actors and non-farmer community members in mobility activities within the village and between villages.

Transportation can function as an opening to the isolation of an area, especially villages located in mountainous areas. Therefore, transportation has benefits as a stimulant for development in rural areas and agriculture because it accelerates both economic and non-economic activities in rural areas and between villages, and also increases efficiency in terms of costs, time and labor. Therefore, the government, both at the local and central levels, must guarantee that there is good infrastructure to encourage agricultural and rural development.

Communication networks are also an important part of developing agriculture and rural areas. The people can take advantage of this communication network to obtain important knowledge and information regarding economic and non-economic activities. In addition, the development of electricity and drinking water installation must also be carried out by the government to meet the basic needs of the community. The electricity network also provides opportunities for community members to develop economic businesses such as small industries and other services.

4. Integrated system of crops and livestock

Since 2008, the local government in Bali has been introduced and implemented the program integrating between crops and livestock, called *Simantri*. There is about 1,000 groups of farmers has been established to run this program. *Simantri* is an effort of the Bali Provincial government in agricultural development by developing a pilot model in accelerating technology transfer to rural communities. This also integrates agricultural sector activities with supporting sectors both vertically and horizontally according to the potential of each region. The main concept in this system is the optimization of the use of existing local resources. In this program, development of the agricultural sector is directed to become the center of Bali cattle breeding which is the Bali germplasm of Bali should be one of the leading national livestock. With the existence of cattle breeding centers spread across eight districts and one city in Bali Province, it is hoped that Bali cattle can be preserved and developed. Therefore, this program is fully expected to develop organic agricultural development in Bali province.

Even in 2019, organic agriculture is not solely aimed at the agricultural sector, such as building sustainable agriculture, but is also directed at realizing sustainable development. Therefore, the policy of the Bali Provincial government together with the legislature provides a breath of fresh air to restore the spirit of development based on local wisdom, which is currently being implemented through the vision of the Governor of Bali, namely *nangun sat kertih loka Bali* (developing Bali through the purification of environment). This policy is the Bali Provincial Regulation Number 8 of 2019 concerning the Organic Agriculture System. The stipulation of this regulation is a measure to control the excessive use of synthetic (chemical) agricultural inputs, such as fertilizers and drugs (pesticides) since the introduction of the Green Revolution in the 1960s.

Economically, the green revolution has had a significant impact on increasing production, especially rice and rice. However, it turns out that the success of this increase in production must be paid for by damage to environmental conditions, such as degradation of soil and land fertility functions, polluted water, air pollution which ultimately has a negative impact on human health and other living things, such as biodiversity that live in agricultural ecosystems. The balance and availability of nutrients in the soil and the life of microorganisms are also disrupted which results in decreased productivity of land and plants. Excessive use of chemical pesticides and that is not wise to the environment also damages ecosystems in agricultural areas and its surroundings. Unfortunately, the animals that functioned as pest predators and environmental controllers that initially lived in agricultural areas died and did not develop, thus triggering pest and disease attacks for plants.

Through the *Simantri*, introduced technological innovation is oriented to produce organic agricultural products with a techno-ecological agriculture approach. Integration activities that are being carried out are also oriented towards zero waste agriculture and produce 4 F (food, feed, fertilizer, and fuel). Its main activity is to integrate plant and livestock cultivation, where plant waste is processed for animal feed and feed reserves during the dry season and livestock waste (manure, urine) is processed into biogas, bio-urine, organic fertilizers and bio-pesticides. The organic agriculture, especially the use of organic fertilizer is addressed to reconstruct the physical soil structure in the agricultural land.

In order to accelerate the development of organic agriculture, the regulation on organic agriculture systems has been needs to be socialized intensively by the government and supported by universities and other institutions in order to provide information, knowledge and understanding to farmers and the general public

regarding organic agriculture itself, both in terms of benefits, methods of manufacture, methods of use and other aspects, especially environment and health, including economic aspects. The understanding of farmers and the community should be encouraged by changing their perceptions and attitudes so that they are willing and able to implement it. Thus, farmers can slowly reduce their dependence on fertilizers and drugs used in their farming management.

The application of this regional regulation is one of the movements towards back to nature but still provides the potential for increasing agricultural production. The campaign on back to nature is one way to convince farmers and also provide education for consumers or people who consume organic products. The reduction of imports of agricultural products can also be controlled through organic farming campaigns. Food and environmental health insurance through the application of this organic farming system will be enjoyed by producer farmers and their families and society in general. Therefore, through consumer education, it is expected that they will have a higher willingness to pay (willingness to pay). This willingness to pay is also a trigger for producers to increase willingness to produce organic product. The development of a strong reciprocal relationship between producer farmers and consumers requires intervention from the government, namely through subsidy or incentive policies, especially for producer farmers. These incentives can be in the form of subsidized agricultural inputs (seeds, seeds, fertilizers, and medicines), product certification, and technical assistance for agricultural cultivation to obtain quality products other than high productivity. Through this intervention, it is hoped that the implementation of regional regulations on organic farming systems can be realized optimally.

If this organic farming system can be implemented, the goal of establishing a regional regulation can be achieved, such as providing guarantees for the supply of agricultural products, especially food that is safe for the health of producers and consumers and does not damage the environment, providing assurance and protection to the community from the circulation of Organic Agricultural Products that do not meet requirements maintain the ecosystem so that it can play a role in environmental conservation. This means that the realization of the Governor's vision can also be supported through the application of organic agriculture which is able to create a harmonious relationship between humans and the environment (both human and natural), as part of the *tri hita karana* philosophy. The improved physical environment could support the agricultural productivity and enhance the income of farmers.

5. Establishment of village-owned enterprises

Village development can be increased through developing the potential of the village economy to become a joint forum for rural communities to develop themselves and their environment independently and in participatory ways. In an effort to accelerate economic growth in villages where most of the people are farmers, the formation of business entities at the village level is urgently needed.

Village-Owned Enterprise, hereinafter referred to as VOE, is a business entity whose entire or most of the capital is owned by the village through direct participation originating from separated village assets in order to manage assets, services, and other businesses for the maximum welfare of the village community. In Bali province, there are 545 VOEs out of 636 villages in Bali which have been developed by the villages through the initiative of local government. The establishment of VOE is intended as an effort to accommodate all activities in the economic sector and or public services managed by the village or inter-villages cooperation. This VOE has

objectives to: (i) improve the village economy; (ii) optimize village assets to be useful for villagers' welfare; (iii) increase community efforts in managing the economic potential of the village; (iv) develop business cooperation plans between villages or with third parties; (v) create market opportunities and networks that support community public service needs; (vi) create jobs for the villagers; (vii) improve community welfare through improved public services, growth and even distribution of the village economy; and (viii) increase the revenue or income of the village.

In many villages, the VOE has run a simple social business that provides public services (serving) to the community by obtaining financial benefits. The business units within the VOE have utilized local resources and appropriate technology, including: village drinking water; village electricity business; food storage; and local resources and other appropriate technology. The VOE has also conducted a rental business (renting) goods to serve the needs of the village community and is aimed at obtaining village income. In this rental business, it has been run the activities, such as means of transportation; party utensils; meeting hall; shop house; land owned by VOE; and other rental items. Besides, the VOE has also run an intermediary business (brokering) that provides services to residents. These business activities include: electricity payment services; drinking water payment services; and village market to market products produced by the community. In term of agricultural sector, this VOE has the business unit that produces and trades certain goods to meet community needs and is marketed on a broader market scale. These include ice small factory; agricultural product; agricultural inputs; agricultural tools and equipment.

In some villages, the VOE has run a financial business that meets the needs of micro-scale businesses run by village economic entrepreneurs. This financial business unit provides access to credit and borrowing that is easily accessible by the village community. Even, the village tourism, eco-tourism and agro-tourism have also run by the VOE.

Based on the survey in some villages in Bali regarding the VOE, it is found that there are five benefits of establishing VOE as follows: (i) commercial; (ii) public service; (iii) economic; (iv) social and culture; and (v) politic. As a commercial institution, VOE is able to open up wider space for the community to increase income and also open jobs for rural communities. The youths who have the potential will find employment in the village thereby reducing urbanization. The VOE is not only engaged in business, but it also has an interest in meeting the needs of the community through its contribution in the field of social services. For example, it provides scholarships to the children of poor household.

VOE also could be a stimulus in driving the economy in rural areas due to the various economic activities run. The economic profit of VOE has been distributed and allocated for the economic village development and other social and cultural development. The economic benefits of VOE can also reduce the cost burden or contribution of villagers to development in the village. In term of political aspect, VOE which is established in a participatory manner, become a forum for interest groups in the village. Agreements regarding the type of business, the percentage of profit sharing, and the issuance of a Village Regulation constitute one of the indirect benefits of the existence of VOE. The good management of VOE might give inheritance to future generations who will continue village development. This means that the VOE could have positive impact to alleviate the poverty within rural area.

6. Conclusion

Agricultural development is integral part to rural economic development which needs to be integrated. Several problems that occur in agricultural and rural

development need to be handled by considering various dimensions. The rural institutions should be involved in the implementation of agricultural and rural development. In case of Bali Province, the agricultural and rural development can be addressed to develop tourism, industry, environment, and economic activities. These could be in the forms of development of agro-tourism, agro-industry, integrated farming system (system of crops and livestock) and village-owned enterprises. The improved agricultural and rural development has accelerated the growth of rural economy, thus decrease the poverty.

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Chapter 7

Perspective Chapter: Water, Natural Disasters and Socio-Economic Development in the Early 21st Century

Manuel Vaquero Piñeiro and Paola de Salvo

Abstract

This chapter investigates the complex relationship between socio-economic development and environmental sustainability by focusing on one of the most vital natural phenomena: the water cycle. Considering the current public awareness of climate change and the growing number of natural disasters, focusing on this topic provides a better understanding of weaknesses and bottlenecks that 21st-century society faces daily. This work presents three case studies, different from each other but conceptually interconnected. The first case concerns the situation of lakes in the world, whose water in many cases is at risk of disappearing. In the second instance, we present the growing socio-economic risks generated by floods. Nowadays, floods play a fundamental role in influencing socio-economic development due to the dislocation of economic activities in Southeast Asian countries. Finally, we discuss desertification affecting large areas of the African continent. One aspect of great interest is the *Grande Muraille Verte* project promoted by numerous countries. Reforestation of large arid areas is the main issue; the attempt is to support local communities to implement agricultural and livestock activities. Socio-economic and environmental sustainability and resilience are the main challenges that countries, regions and local communities are facing.

Keywords: natural disasters, water, lakes, cities, industry, floods, Asia, desertification, Africa, reforestation, agence panafricaine de la grande muraille verte

1. Introduction

The seventies and eighties of the 20th century marked a turning point for the environment and environmentalism [1]. A chain of dramatic events brought the threats looming over the future of natural resources and, more generally, the planet's ability to absorb the negative consequences of industrial development to the public attention. The hundreds of deaths caused by the gas spill at a Union Carbide factory in the Indian state of Madhya Pradesh (1984), the fears triggered by the accident at the Chernobyl nuclear power plant (1986), or the coasts of Alaska covered by a dense one tar coat after the sinking of the oil tanker Exxon Valdez (1989) are just some of the tragic news that marked, at the end of the last century, the progressive materialization of the challenges connected to the fragile

medium-environmental balance that risked breaking forever. The images of the disasters were added to the constant references from the scientific world on the consequences deriving from the greenhouse effect and the lack of alternatives to the rapid depletion of energy sources of fossil origin [2]. As it is apparent from studies conducted on resilience and ecological footprint, 1970 appears like the time when economic growth became less sustainable. But the signs for the advanced economies to find themselves at a crossroads were many and came from a plurality of directions. In addition to a continuous succession of tragic events to be punctually placed in different places on the planet, the economic system born after the Second World War proved inadequate to deal convincingly with massive evolutionary processes, such as the demographic growth of developing countries, the formation of immense metropolitan areas or the global pressures resulting from the overrun of emerging economic powers. In the context of greater global sensitivity toward less invasive [3] forms of progress, international organizations and economically more developed countries, urged by an increasingly sensitive public opinion toward certain behaviors of exploitation of natural resources without limits and rules, were obliged to place ecological issues at the center of an articulated reflection on economic development models aimed at correcting the distortions deriving from pollution and land occupation, to recall only two points from a long list of issues [4]. In 1985, 28 countries signed the convention for the protection of the ozone layer and 2 years later, in 1987, an agreement was reached in Montreal on substances harmful to the ozone layer. Summits, these and others, which paved the way for the Kyoto Convention (1997) on climate change. At the same time and together with the succession of international discussions on apparently technical matters, at a more general level, in the last two decades of the last century, the concept of sustainable development [5] began to make its way. While the urgent need to limit the damage accumulated over half a century of unstoppable industrialization was evident, at the same time it was equally essential to arrive at the formulation of a different growth paradigm based, no longer on indiscriminate consumption but attentive to the quality of people's lives, energetic diversification, the use of advanced technologies, cooperation between countries [6–8]. Thus the conditions for the holding, in 1992, of the United Nations conference in Rio di Janeiro (Rio Earth Summit 1992) on the environment and development matured, hinged on the imperative to combat environmental degradation as a multiplier factor of poverty and social inequalities [9]. In the background was now placed the awareness that environmental issues had to be addressed in the broader and more intertwined framework of the escape from hunger and underdevelopment [10]. Despite the setbacks, the work program defined in Brazil was resumed 10 years later in Johannesburg to reach the conferences on climate change in Lima (2014) and Paris (2015) at the beginning of the 21st century. Moving from general to sectoral approaches, it is worth remembering that the first world conference on oceans will be held in New York between 5 and 9 June 2017, an event to be placed in the context of the 2030 Agenda for sustainable development. In fact, the oceans contain 97% of the planet's water which contributes 86% to rainwater, thanks to evaporation. On the subject of maritime waters, the irreplaceable role of oceanic masses in biodiversity and economic activities related to fishing (about three trillion dollars) should also be mentioned. The United Nations appointment was indeed preceded by a few days after the announcement by the President of the United States, Donald Trump, of the country's withdrawal from the Paris Convention. Undoubtedly, the American decision, justified in terms of defending employment levels and relaunching the national economy, not only constitutes a hard blow in the search for solutions that comply with climate needs but at the same time makes the thesis of growth deriving from traditional industrialization processes. Although it is premature to speak of

consequences and concrete effects, the decision of the republican administration has actually moved the hands of world environmental policies back by 20 years. Despite the presence of positions likely to undergo radical changes and although the branched environmental reality cannot be considered fully consolidated, subject to continuous formulations of compromise to smooth out the contrasting positions, the "rebirth of nature" [11] has followed other paths. From this point of view, this is the rather evident case of the rediscovery, always at the end of the 20th century, of the landscape to the point of making the environment and the landscape two terms that are sometimes interchangeable. It goes without saying that this is obviously an excessive schematization but at the same time that in post-industrial society the defense of the environment became a reason for political commitment, the landscape was assigned a precise qualifying value of socio-economic contexts [12]. In other words, the request made to politics and the economy to commit itself to avoid indiscriminate consumption of natural resources did not respond solely to the need to favor responsible production processes, this need also arose from considering nature a determining factor in the formation of a common cultural heritage. Through the UNESCO Convention of 1972 and subsequently the European Convention of 2000, the landscape came to occupy a "central, if not indispensable, position in philosophy and geography, without forgetting its increasingly marked place within sociological, anthropological and archaeological theories" [13] the presence of the landscape as an economic stimulus. In the decades that marked the transition from the 20th century to the new century, the landscape, in its dimension of abstraction of nature, became perceived in its immaterial dimension as an asset to be preserved and enhanced. Certainly, it would be illusory to carry out a detailed examination of all the aspects (positive as well as negative) of a story whose plot sees the dense intertwining of political, cultural, economic and social components to the point of making the environment-landscape combination one of the characterizing traits of the first steps of the 21st century. Changes that involved (it could not be differently) the social sciences called to confront a society that found in nature, whether it was declined in terms of environment, territory or landscape, anchor points capable of filling the void left by nature, disappeared from the myth of factory work. And so [14], have evolved from being the background on which to project human action to having a leading role by feeding on socio-historical study plan a multidisciplinary reflection on the forms and implications of the composite interdependence between man and the environment. In this regard, some initiatives help to better mark the path taken: the American Society for Environmental History was established in 1976, while in 1999 it was the occasion of the European Society for Environmental History, both associations with their own journals (Environmental History and Environment and History) [15]. Instead, J. Donald Hughes goes so far as to say that it is "a type of history that is interested in human beings to the extent that they have lived, worked and thought in relationship with the rest of nature, through the changes that have taken place over time". The human species is part of nature, but compared to most other species we have brought about far-reaching changes in the conditions of the earth, sea, air and the plants and other animals that share the planet with us [16]. In this specific field of scientific research with a strong social commitment, Italy has not been left behind, on the contrary, it has a large number of authors to its credit who have been able to intercept the stimuli coming from the environmental side. It is first of all worth remembering the far-sighted views of Alberto Caracciolo who, in 1988, wrote The Environment as History [17], an agile and concise notebook that represented the beginning of a fertile line of studies. In fact, over the course of 30 years, the studies conducted by Piero Bevilacqua, Roberta Morelli, Paolo Malanima, Guido Alfani, Luca Mocarelli, Renato Sansa, Ercole Sori, Simone Neri Serneri, Salvatore Adorno, Marco Armiero,

to make a quick and incomplete list of names, have allowed the formation of a rich and varied heritage of studies on forests, energy, common goods, waste, reclamation, landscape, mountains and, more generally, on the territory, the environment and, as far as we are concerned, on water [18–22]. Paying attention to the life cycle of water, offers the opportunity to grasp how much the society of the early 21st century is forced to deal with a context full of fragility and contradictions that raise numerous questions that are not easy and immediate to answer. In one case, the evolution of large lakes is briefly sketched given the fact that some of them are at risk of disappearance or radical downsizing as lake water has become too precious a commodity. The second focus aims to highlight the bottlenecks that can be generated worldwide following the dislocation of industries and production processes in areas of the planet at frequent risk of floods and natural disasters. From this point of view, it is emblematic of what happens in the countries of Southeast Asia. In this case, the challenge will be to reconcile the economic well-being deriving from industrial employment with the needs imposed by the government of potentially destructive environmental phenomena. The third case study focuses on the African regions most affected by desertification and the impoverishment of agricultural land due to lack of water. In this scenario, water is a scarce resource on which the future of thousands of people depends. In an attempt to stop the advance of the desert and to allow the recovery of soil fertility, the ambitious project of the Grande Muraille Verte was born, an initiative that involves a large number of countries and their main objective is to complete the reforestation of the territories threatened by the desert. An initiative that constitutes an eloquent synthesis of some of the major environmental challenges to be faced without too much delay.

2. Lakes: Fragile environmental ecosystems

Although Adam Smith used water to establish a concrete distinction between "use value" and "exchange value" [23], in actuality this disparity appears very blurred as water has been transformed into a good that has a precise and high economic value [24]. The issues related to the use of white gold are so complex and at the same time so symbolic [25] that we are now openly talking about a new sensitivity and culture of water [26]. For this reason, it does not go unnoticed that water occupies a prominent place among the many and very diversified approaches taken, now on the theoretical level of the programs, now on the operational level of the achievements. The reason is simple enough to understand. Water, among all the elements that contribute to defining a given ecosystem, is the one that contributes to the greatest extent to measure the health of the social conditions that regulate the interaction between man and the environmental context. Over time, different ways of using water have followed, which have shaped the water system to the new needs and requirements of an evolving society. Water must not only be placed at the base of any sustainable [27–31] development project but according to the latest works of the WWAP (United Nations World Water Assessment Program), the production of energy and the creation of conditions for guarantee access to income for the populations who live in the most disadvantaged areas of the planet [32, 33]. Today, when dealing with the issue of water and available water resources, we usually resort to large numbers: 12% of the planet's population has access to the world's water resources and wastes 85% [34]. The data available are many others even if they have in common the fact that they highlight that the distribution of the good water presents strong regional and social imbalances. Of the 1400 million cubic kilometers of water available, freshwater scarcely accounts for 2.5%, and of these, an even smaller amount (0.3%) is made up of the waters present in rivers, lakes and the

atmosphere. The remainder is found in glaciers and underground. If they now look at the dominant situation on the employment front, the distortions do not tend to disappear, on the contrary, they appear even more marked as agriculture grabs 70% of the world's water resources, leaving 20% for industry and 8% for the domestic consumption. For a correct understanding of such percentages, it must be said that irrigated agriculture guarantees 40% of world food. That is, compared to the water consumed, the contribution in terms of food is much lower. The data just mentioned clearly signal the inseparable link between water and food production. However, in recent times, precisely in the agricultural sector, we are witnessing processes that generate many critical issues. It is the case, for example, to encourage the use of biofuels whose manufactured from plants, such as sugar cane or corn, requires the availability of large water resources. In this way, an evident clash of interests is created between the enhancement of renewable fuels and the exploitation of a scarce and precious commodity such as water, above all in those regions of the world where the phenomenon of land grabbing is modifying traditional agro-pastoral systems, disruptive processes from which conflicts and mass migratory movements [35] then derive. If we add to all this that the impetuous growth of the urban population causes an increase in the demand for food, we understand the terms of a dangerous accumulation of clashes of interests that are played out by discharging the social and political tensions on access to natural resources, in first and foremost the water ones are the most fragile and vulnerable. Suffice it to say that in the course of the 20th century, withdrawals of freshwater have increased on a global scale by almost seven times [36]. But in terms of perception, not all water reserves are the same. In recent times, in the wake of the blue revolution [37, 38], the interest of the scientific community but also of international organizations has essentially turned to issues related to running waters [39]. The figure of the countries crossed by the major river courses in the world (the Nile, Tigris, Euphrates, Indo or Mekong), the immense volume of water resources available should be at the basis of basin economic development projects. Instead, and in the absence of mutual cooperation projects, the construction of artificial dams for reasons that are now hydroelectric and now irrigated often leads to political and military tensions between countries [40, 41], each committed to defending its specific national interests along the river [42]. Conversely, for lakes, except the literature on pollution, there is a lower volume of reflections, perhaps because the pools of water are more difficult to integrate into industrialization processes [43]. Hence many lakes, in the absence of specific environmental protection policies, can be transformed into simple deposits of industrial and urban residues, if not into useless spaces to be suppressed. In fact, and confirming how much the history of lakes has to deal with a very simple past, it should not be forgotten that they, as part of the broader category of stagnant and marshy waters, were even seen as a real danger for the people's health as a source of diseases and infections [44–46]. Better, as evidenced by the long history of Italian land reclamation but not only [47], proceeds to their suppression by transforming the soils of the freed lakes into new territories suitable for the practice of agriculture. But in recent years, attention to surface waters has become increasingly relevant, identified as one of the most important natural values of societies [48]. In this renewed interest, lakes become significant resources for territorial socio-economic development. They represent natural ecological places that allow the approach of nature in urban contexts, break the monotony of the landscape, diversifying it and becoming part of the identifying symbolism of resident citizens and therefore an identity resource. They are also a social resource for the recreational, tourist and aggregation possibilities made possible by the presence of a network of services that improve their use. The new possibilities of using water, which involve not only protection and conservation but also

enhancement and promotion, still represent a form of anthropic influence on the lake that must be sustainably managed and governed [49]. In the world, there are in total 253 large lakes distributed mainly between the American, African and Asian continents [50]. In general, the waters of the lakes do not know a good state of health, threatened by the disappearance and by suffering strong pollution processes [51]. In fact, and to start with the most emblematic case, the satellite images taken between 2000 and 2006 document the enormous natural disaster that took place with the disappearance of the Aral Sea, almost to the point of decreeing the complete drying up of what had been one of the largest deposits of freshwater of the world. Of the original 68,000 square km, just over 10% remain, the remainder is now a lifeless deserted sandy land. The reasons for what happened are widely documented: at the time of the Soviet Union and to allow the irrigation of the cotton fields of Uzbekistan, the two main rivers that fed the lake were diverted, for this reason, condemned to remain without emissaries. The consequences are there for all to see, immortalized by dozens of images of old rusty boats buried by the desert sands, in the places where until a few decades ago there was a fishing port at the center of a thriving regional economy. Another sensational case of how the distortion in the allocation of flowing waters [52]caused the loss of another important freshwater reserve is located in the Andean plateau between Peru and Bolivia. We are talking about Lake Poopò which has undergone an irremediable shrinking process [53]. Although, in this case, it is a natural phenomenon that repeats itself with a certain periodicity, experts observe the phenomenon with concern as the disappearance of water could depend not so much on natural causes as being the direct consequence of its systematic use of the waters of regional rivers in gold and silver mining operations. While waiting to understand if we are in the presence of a transitory situation or if all this represents a definitive environmental loss to be attributed even in this circumstance to a precise choice of economic policy, the fact is the end of the economic activities of indigenous communities, dependent on always from the practice of fishing. As in the case of the Aral Sea, the Poopò lake has ceased to be a reservoir of aquatic biodiversity. Without leaving the Andean area, not even the situation of the other large lake in the region, the Titicaca, can be said to be too encouraging. As is known, lakes tend to accumulate substances that prevent the reproduction of flora, which is essential for the life and reproduction of fish species. In the case of Titicaca, the problems derive from the increasing levels of water pollution. If, on the other hand, we move further north along the American continent, what about Lake Nicaragua through which the third channel between the Pacific and Atlantic oceans should pass. To realize the mammoth project behind which we can see the interests of China, eager to have its own trade route through the Central American isthmus, the Nicaraguan lake would in fact become not only the corridor through which giant container ships pass but also an immense reserve of water to be used in the construction of the impressive engineering work with evident negative repercussions on the fragile environmental balance of the region [54]. Changing geographic scenery, not even the biblical Lake of Galilee or Tiberias appears immune from suffering serious problems of environmental deterioration. If the Gospels hand down that Jesus performed the miracle of filling the nets of the apostles with an extraordinary quantity of fish, today the picture appears instead radically changed. Given the real risk of the Tiberias losing its fish fauna, the government of Israel has banned the practice of fishing by launching an urgent repopulation program. On the other hand, in the African continent, Lake Victoria presents just as many management complexities, especially as regards the practice of fishing, which has always been the main resource of the local population [55]. It must be said, however, that in recent times tourism has been growing and has begun to affect the creation of a different image of Lake Victoria, as is the case with the

Titicaca. In this way and responding to the precise needs of the international leisure industry, which always needs to have new destinations available to the general public, the traditional fishing economy could be replaced by other logic. The presence of water, the movement ensured by navigation, the possibility of fishing and other recreational activities are in fact facilitating an anthropization of the lake areas which is allowing the lakes to become a real tourist attraction. And it is precisely the increase in demand for tourist services in lake destinations and the rapid evolution of travel that have led to the exploitation of the lake environments. The lake attracts tourists who identify it as the main reason for their vacation, but also those who experience it as part of a tourist experience that finds the main motivation for moving in other interests. The lakes thus become not only an attraction in themselves but also an attractive setting for the enjoyment of free time. This is how the chapter measuring the positive and negative effects deriving from the transformation of lakes from spaces inserted in specific agricultural economies into places of leisure and entertainment is outlined.

3. Floods and industrial relocation to Asian cities

As emerges from this work, since the end of the last century environmental issues, in alternating phases, have occupied a prominent place in the contemporary public debate. If in the 1970s the risk of rapid depletion of fossil energy sources began to be pointed out, during the 1980s a series of terrible disasters accelerated awareness of the fragile balance between quality of life and economic development resulting from indiscriminate exploitation of natural resources. However, and despite the widespread sharing of positions over the course of almost half a century, the environmental question still remains an area of lively political discussion that has fueled divergent positions among those who interpret environmental issues in terms of opportunities for the qualitative growth of society and those who argue that environmental protection, to be subordinated to other priorities, must not be a brake on growth. We can see this divergence of positions still at the beginning of the 21st century when the European Union Commission launched the European Green Deal [56] while other important economic systems remain anchored to more traditional scenarios. If we were to borrow the theories of the American economist W.W. Rostow, to summarize the current situation, it could be said that we are witnessing the difficult harmonization between mature economies engaged in the search for new stimuli and emerging economies in full transition or imminent take-off. Faced with such a picture, dominated by extremely fluctuating international balances, the positions taken on the consequences of climate change often end up serving as a simple background to old disputes. If on the one hand, the environmental reasons continue to find many obstacles to become the reference point for a different approach to the concept of economic development, on the other, the geography of the dislocation of industrial plants, which took shape in the decades around the turn of the 21st century, has shifted the interest on the risks deriving from the transfer of entire production chains to areas of the planet liable to suffer the consequences of frequent and devastating natural disasters. The terms of an interesting intertwining of dynamics are defined almost contradictory because, if at the same time the delocalization of industrial work can prove to be a valid tool for improving the living conditions of the population of the poorest countries, at the same time, it is equally evident that this choice that has actually ended up favoring geographic areas that are particularly vulnerable from an environmental point of view. Within the context of the dynamics of the global economy, the terms of two apparently opposite phenomena are defined to be highlighted by following different research paths. As

is well known, natural disasters contribute decisively to increasing poverty and the precariousness of people's lives, especially in the poorest countries. Indeed, the correlation between poverty and natural disasters [57] appears undoubted. According to the World Bank's calculations, enhancing the resilience of the poorest communities would produce resource savings of about 100 billion dollars a year, reducing the impact of natural disasters on the well-being of citizens by 20%. Communities less endowed with resources and solid institutional systems have a noticeably less responsive capacity. Examples would be innumerable. In these cases, the responses are much less effective, with serious consequences also on the level of education and health of the affected communities. By fueling a negative circle, poverty deepens, even more, favoring social insecurity, mass immigration and in many circumstances, even armed conflicts. In the early 21st century alone, the cost of damage caused by "natural disasters" amounted to nearly $ 2500 billion, but UN calculations indicate an underestimate of the order of 50%. If we look at the statistics referring to over a century of natural disasters (1900–2015) the data collected are eloquent: 8 million deaths and damages for 7 trillion US dollars [58]. It is true that the most reliable estimates begin only after 1950. Also with regard to the trend of the victims, the evidence obtained demonstrates a plurality of aspects to be taken into consideration because, on the one hand, the natural disasters identified experience a growing trend starting from "last twenty years of the 1900s, the confirmed victims seem to have undergone a radical downsizing from 200,000 people who died in 1970 to less than 30,000 in 2011". Positive evolution, resulting from the application of increasingly effective safety and prevention systems as well as on the quality of buildings. It is no coincidence that the problems of "holding on to places" of communities affected by natural disasters are becoming one of the basic guidelines that guide national and international intervention strategies. That the issue is of considerable importance is shown by the attention paid to the issue by the main insurance companies, involved, not surprisingly, in monitoring and providing continuous feedback. To refer to the data provided by the Munich Re insurance company, between 1980 and 2018 there were 18,169 natural events of catastrophic significance worldwide, for a total of 1.7 million deaths. In 2017 alone, losses amounted to $ 250 billion. In consideration of the nature of the event, hydrological events (floods) are placed first, amounting to 7350 of which 3501 in Asia (47.6%). Then come the meteorological catastrophes (snow, typhoons) with 7125, also in this case there is a sad record of the Asian countries (2085, 30%). Third, drought and heat appear (2111) and lastly earthquakes (1584). Divided by geographic areas of the planet, the greatest criticalities tend to be concentrated above all in Asia (**Table 1**).

To make a quick reference to the last year, for which we have data, 850 natural events of catastrophic significance occurred in 2018 [59]. Geophysical events such as earthquakes [60], tsunamis and volcanic eruptions accounted for 5% of the total.

Disaster	North America	South America	Europe	Africa	Asia	Oceania	Total
Geophysics	198	135	148	108	908	92	1.584
Meteorological	2.256	263	1.443	546	2.089	545	7.125
Hydrological	875	738	890	1.059	3.501	298	7.350
Climatic	560	135	466	269	544	142	2.111
Total	3.888	1.271	2.944	1.982	7.041	1.077	18.169

Source: https://natcatservice.munichre.com/

Table 1.
Number of natural disasters (1980-2018).

Storms reached 42%, floods and landslides 46%, while the remaining 7% correspond to very heterogeneous categories such as desertification or fires. Divided by continents, the sad record of Asia (43%) is confirmed, followed by North America (20%), Europe (14%) and Africa (13%). According to the Food and Agriculture Organization (FAO), natural disasters caused a total of 96 billion dollars in losses to agriculture in developing countries between 2005 and 2015 [61]. This is a huge amount that is practically impossible to recover as, to a large extent, it affects economic systems that are too backward. Half of the losses are located in Asia due to the combination of long periods of drought and torrential rains. If we add to the damage that occurred in the Asian continent those that occurred in Africa and Latin America, the drought alone caused losses of about 30 billion. As can be seen from abundant statistical material, worldwide natural disasters are becoming less deadly but more expensive for the economy. This is what has been observed since the end of the 1980s in a country like Thailand where the growing dislocation of Japanese car factories (Honda, Toyota) [62, 63] and photographic material (Canon, Nikon, Sony) in the alluvial valleys around the capital Bangkok ended up causing the occupation of the spaces traditionally used for rice fields. The most evident negative consequences of this dynamic occurred in 2011 when due to the flooding of highly specialized industrial plants, the country suffered losses estimated at 40 billion dollars and the world car market experienced a significant slowdown. The case of Thailand, to be taken as an example, should be placed in a more general context since trends such as urban development and economic growth in developing countries increase the likelihood of natural disasters with a great economic impact. It is estimated that in 2070, seven of the 10 largest urban centers in the world exposed to the risk of flooding will be located in developing countries. In fact, the effects of the divergence between city growth and losses (human and material) in the event of natural disasters are captured. If on the one hand, the enlargement of the urbanized part reduces natural defenses against disasters, on the other hand, the cities themselves contribute to the socio-economic progress of the poorest social strata. Therefore, and as part of a very articulated debate, in certain areas of the planet [64], the challenge of the century is to make compatible the measures to contain the impact of disasters without losing the role of cities as a vehicle for improving the conditions of life of the population of the least developed countries.

4. Desertification in Africa: programs for the recovery of environmental balances

According to the United Nations, more than 25% of the planet's cultivated land is affected by the advance of the desert, "jeopardizing the livelihoods of more than a billion people" [65]. Every year about 10–12 million hectares of land are hit by degradation processes. The phenomenon is particularly serious in Africa, Asia, South America and the Caribbean, but it also affects the United States, Australia and Mediterranean Europe [66]. About 265 million people are affected by food shortages in sub-Saharan Africa alone. Due to desertification [67] Nigeria, the most populous nation on the African continent, with about 190 million inhabitants, loses every year over 350,000 hectares of pastures and arable land. The majority of migrations that move from these regions toward Europe are produced by the fertility crisis of arable or pasture land. The African continent's land, the fertile one able to generating life, has become a scarce resource, and therefore, highly attractive. Squeezed in the grip between demographic expansion, with the consequent increase in the demand for food, and a decrease in its actual availability, as a result of the processes of desertification and other forms of degradation or definitive

removal from agricultural use and therefore from the production of food and of numerous other commodities (from textile fibers to oilseeds, to timber), the land in the African continent, the fertile one capable of generating life, has become a scarce resource, and therefore highly palatable. And it is also from here that land grabbing originates, the impressive and disturbing race of states and multinationals to grab arable land, generally in poor or developing countries. A phenomenon, land grabbing, already known, that episodically accompanied the history of colonialism in the 19th and early 20th centuries, but that in the last 15 years has taken on completely new and absolutely extraordinary peculiarities and dimensions. Also becoming the same cause of expulsions of a large number of peasants and entire village communities and at the same time, due to the adoption of an intensive and monocultural agricultural use, of immense processes of degradation and often the definitive death of the land itself. According to some estimates, between 2006 and 2011 alone, as many as 200 million hectares of fertile land were acquired by private companies and foreign governments mainly concentrated in Africa but spread over a very large area, from Latin America to several Asian countries. But what are the causes of desertification, one of the most worrying phenomena of our time and fraught with catastrophic consequences?. It is perhaps worth noting that the term desertification does not refer only to the enlargement of the perimeter of the desert, of an existing ecological reality that expands, engulfing neighboring areas previously cultivated. This is also a real and worrying phenomenon, which is becoming evident almost everywhere, from the Sahara to the Gobi desert in China, generating other impressive theories or processions of refugees or environmental migrants. More specifically, it indicates the "progressive degradation" of the characteristics of arable soils in their various aspects - mechanical, physical, chemical and biological - as a result of the interactions between natural factors and human activities. As the definition adopted by the United Nations Convention to Combat Desertification [68, 69]-, signed in Paris on October 14, 1994 - states, "the term desertification designates the degradation of land in arid areas, semi-arid and dry sub-humid caused by various factors, including climatic variations and anthropic activities". Natural factors, such as climate and human activities, favored or not in their negative effects by the environmental peculiarities of individual territorial contexts, are therefore at the origin of the progressive degradation of soil fertility. Although climatic conditions are not independent of human life, since one of the causes of their change is, as is now known, precisely human activity. And it is in fact the latter, with its concrete forms of activation of the earth resource and their intertwining with local environmental specificities, the main origin of soil erosion processes. In many regions of the intertropical belt of the Earth, the area of the greatest concentration of desertification phenomena, alongside the immense deforestation that has radically changed the pre-existing environmental frameworks and the industrial and monoculture agricultural use that has accompanied and accompanies the land grabbing, one of the main causes of soil erosion lies in the increasing intensification of the levels of land exploitation, determined by the rapid and sustained demographic growth that has unfolded since the second half of the 20th century. In fact, as already mentioned, it took concrete form in the lengthening of the years of cultivation, until it was almost continuous, and in the consequent reduction, sometimes up to the almost complete abolition, of fallow, the practice of regeneration or reconstitution of the fertility of those soils, generally not very deep and in need of the continuous supply of organic matter. In Africa, and in particular in the central regions, with a rurality index that still at the end of the first decade of this century was around 60% of the total population, the demographic increase, estimated between 1950 and 2010 and beyond 364%, against a world average of about 174%, has resulted in a drastic reduction in the "amount of land that each

family can cultivate". Over 40 years, between 1970 and 2014, the availability of arable land in sub-Saharan Africa decreased, in relation to the rural population, from an average per capita extension of about 4 hectares to 1517. This has determined a twofold but convergent consequence: on the one hand, the decrease, in the individual conduits, of grazing areas, with the consequent decrease in livestock and the availability of manure for the reintegration of soil fertility; on the other hand, a strong intensification of the exploitation of the soils themselves through the extension of the cultivation period and the drastic limitation of the millennial and regenerative practice of fallow. "For a large part of African farmers - reports one of the world's leading experts in agricultural regeneration, Roland Bunch - the periods of rest of the earth have gone from 15 years in the seventies to about ten in the eighties and just 5 in the nineties. Today, most of them can keep their land fallow for 2 years at the most, and many cannot even afford to do so ". In a pedological context already marked by vulnerability, characterized by "une faible fertité [70] " the outcome, also supported by climate change which has massively altered the rainfall regimes and little or not at all mitigated by the very limited use of mineral fertilizers, is the drastic and rapid reduction, to the point of total exhaustion, of their weak fertility and their productive capacity. It is estimated that since 1970 the Sahel region has lost about 12 million hectares of land equivalent to about 20 million tons of cereals. If, in consideration of what has been said up to this point, in crowded Asian cities the containment of the economic and social damage deriving from natural disasters, earthquakes and floods, first of all, calls into question the progress made in the construction of buildings and in the planning of urban spaces, in the case of the countries along the vast sub-Saharan area, attention shifts to the measures to be taken to curb the progressive desertification that the region is experiencing. Considering what has been said previously on the semantic value that one wants to give to the word, it does not matter if the desertification of the sub-Saharan region is to be understood in terms of the advance of the desert sands or of increasingly less fertile soils due to the lack of adequate regeneration of the organic soil properties. Indeed in many countries, both phenomena go hand in hand, pushing indigenous communities that live off the practice of agriculture and pastoralism to abandon traditional economic occupations to swell the ranks of the massed suburbs of the cities of the continent or to undertake the route of emigration towards the "Europe". Already in 1952, the English botanist Richard St. [71, 72] Baker raised the dangers caused by the advance of the desert by promoting the idea of building an immense green barrier. The idea was revived in 2002 at the summit of N 'Djamena, the capital of Chad, with the creation of the Agence Panafricaine de la Grande Muraille [73] (APGMV) or Great Green Wall led by the African Union [74, 75]. As yet, the countries involved in the "great green wall" project (almost 8000 kilometers between Djibouti and Senegal) are more than 20. Notoriously, the Sahel is one of the poorest regions in the world where climate change contributes to creating a permanent state dominated by factors that favor drought and food shortages as well as the proliferation of conflicts and mass migration, a picture that has become even more dramatic since in recent years the precarious living conditions of the population have favored the consolidation of fundamentalist terrorist groups. Three billion US dollars have been allocated for the period 2016-2020 and one of the priority objectives to be achieved is to achieve land management that will "inverser le processus actuel de dégradation des terres en vue d'atteindre la neutralité en termes de dégradation des terres. La sensibilisation et l'encadrement des populations aux meilleures techniques et pratiques de gestion durable des ressources naturelles et des terres et des systèmes de production ruraux les plus adaptés au terroir" [76]. Naturally the "Great Green Wall" initiative raises many diplomatic, legal, institutional and, last but not least, social implications that in the coming

decades may have concrete reflections on the future of an important part of the African continent. In this case, however, what we want to emphasize is that this initiative is evidence of the actual capacity of contemporary society to know how to adopt strategies that can respond to the challenges imposed by climate and environmental issues. In an attempt to grasp the ecological impact that the cooperation program underlying the APGMV has, just think that in this vast sector of the African continent the fate of millions of people depends solely on the availability of land which, now for agriculture, now for breeding, it is the only source of sustenance available. In few other parts of the planet, people's survival is so closely linked to access to land and the presence of conditions that make it fertile, starting with the regular availability of water reserves. In the absence of other economic alternatives, 83% of the region's population appears to be subordinate to the land but almost 40% of the main and only available resource risks disappearing under the desert dunes. To make the situation even more dramatic, it must be added that the available water barely satisfies 3% of arable land. The program of the barrier or green wall, in an extremely weak human context, has set itself the goal of obtaining the lasting management of fertile land in the hope of enabling people to have a less precarious resource available. Even in the presence of common objectives, each country adopts specific strategies and measures from the moment in which the intervention promoted by the individual states cannot fail to establish a fruitful dialog with the traditional practices in force in the respective local agroforestry systems [77, 78] must become a support tool, knowing how to interact with a branched socio-cultural background . Until now, the most encouraging results come from countries such as Nigeria, Senegal and Ethiopia [79], which have become the scenario of restoration of millions of hectares of land through the planting of acacias as this tree, in addition to proving particularly resistant to climatic conditions in areas where rain constitutes an exceptional atmospheric event, offers the possibility of guaranteeing a series of raw materials such as leaves for grazing animals or construction timber. Faced with the obstacles to be overcome, it is no exaggeration to say that the great green wall establishes a precise division between two scenarios: on the one hand the impoverishment of soils, mass human movements toward the peripheries of continental or European cities, the spread of fundamentalist movements, on the other hand, the possibilities of economic growth, social cohesion, political stability. Two scenarios are to be placed against the background of environmental issues on which the future of the African continent depends but also on the nearby shore of the Mediterranean Sea.

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The book brings together a series of contributions with a common goal of reflecting the links between economic development and rural development. The scenario is dotted not only with old and new wounds but also with innovative strategies in an attempt to overcome existing delays. The chapters of the book are composed of scenarios full of case studies. The plans to be adopted to help the countries that have lagged behind fueled an intense debate since the obstacles to development, as evidenced by the extensive scientific literature available, now appeared to be the realities present in the socio-economic structures of a large number of villages. Although the data available are still few, it is assumed that the Covid-19 pandemic will make a landscape already full of criticalities even more fragile.

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