

Implications of Micro-Level Fractal Poverty Traps on Poverty Reduction Strategies at Meso and Macro Levels

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Abstract

Poverty, particularly in developing countries, is endemic and has attained a crisis stage. It is compounded by conflicts, corrupt/inefficient governments and other manmade issues that seem to keep people in perpetual deprivation and want. Although serious, this poverty trap is fixable. This paper reports on an ongoing research about poverty reduction strategies. It is based on the proposition that the first step in poverty reduction is understanding what makes an agent trapped. Therefore, this paper conceptualises poverty traps as fractal, self-perpetuating conditions when individuals are caught in a vicious cycle of poverty and continue to suffer from undesirable hardships for a long period of time. Using the neo-classical economic development theory and data obtained from the United Nations Development Programme, this paper argues that current poverty reduction strategies, which have been in use over the last five decades, have been ineffective. From the experiences of one of the authors in poverty reduction over the last two decades, a new poverty reduction strategy that focuses on individuals is thus proposed. This strategy uses the synergetic concept that indicates the simultaneous causation of poverty through the interaction between the individual and the context. This paper demonstrates that individuals in poverty are caught between externalisation and internalisation of conditions that are nonetheless transient and removable. Based on this new understanding, a four-stage interactive model called Learn, Relate and Adapt (LERA) is proposed for use in poverty research and the poverty reduction implementation strategy.

Keywords/Phrases: poverty, fractal poverty, neo-classical economic development model, synergetics, LERA Model

1. Introduction

Research on human conditions, human development and social welfare largely address the same issues of poverty, healthcare and so on. Recently, research on poverty has shifted its focus to the persistence of poverty in developing countries, particularly the poverty trap (Chantarat & Barrett, 2008). Researchers (Cazzavillan, Donadelli, & Persh, 2013; NASCHOLD, 2012) indicate that the poverty trap denotes the situation of people living in poverty that makes it difficult to escape due to its multidimensionality. There is also no single formulation of the poverty concept although there has been significant overlap in meaning. A common definition of poverty is any form of inequity – characterised by social exclusion – in the distribution of basic services for decent living conditions that are essential to human dignity (Asselin, 2009). These conditions enable individuals, households or communities to meet their basic needs for food, adequate education, healthcare, nutrition, safe water and sanitation. Other needs include employment, living environment/housing, access to productive assets, access to markets and community participation/social peace. On the individual level, the multidimensionality of poverty can be further classified under sub-dimensions such as gender and age. These sub-dimensions further imply poverty trapping since children, women and the aged turn out to be more vulnerable than others.

Therefore, poverty traps indicate conditions when an individual or an economy (communal, national or regional) remains in persistent underdevelopment for a long period of time. It is a self-perpetuating condition.

An individual or an economy is caught in a vicious cycle that makes an agent suffer from undesirable economic hardship and other deprivations for a long period of time. Several authors (e.g., Sachs, 2004) report the existence of several factors that entrap individuals and societies in conditions of poverty and subsistence living. For example, the AIDS pandemic has wreaked havoc in some African countries and has lowered the productivity of individuals. Similarly, the incidence of malaria is rising due to drug resistance and the lack of effective public health systems in other cases. Meanwhile, Africa's population continues to soar, adding ecological stresses to the economic strains. Some advanced countries have again devised policy-based development lending to Africa over the past decades. This is referred to as the 'aid trap' (Hubbard & Duggan, 2009) because stringent conditions ensure that the borrowing countries remain in debt for a long time. As a result, Africa and its people have heavy debt burdens. Generally, African countries remain mired in poverty and debt.

Collier (2007) opines that individuals and/or communities can get out of poverty unless they are trapped in it. In the case of countries, they continue to be poor due to a number of challenges relating to healthcare, conflicts, natural resources and inefficient governance. As a country remains poor, its people become entrapped in poverty. This is because as one agent (government, community, individual and so on) gets trapped, other agents are afflicted in varying degrees since agents are interdependent; as such, poverty multiplies or mutates. For example, a poor individual farmer may get sick, resulting in the decline of his or her farm's productivity. This farmer may have a contagious disease, and due to the absence of health facilities, others will be infected, thereby resulting in decreasing productivity from the individual to the community level. The most destructive of the traps is when poverty is spread from the individual to the community and national levels, that is, when micro, meso and macro scales are trapped.

As much as the national scale (macro level), individual-scale poverty has been extensively investigated in the literature. This latter scale is generally defined as an individual living below US\$1.25 per day. On the other hand, household-level poverty means that the household members are individually living below the subsistence level in the aggregate amount. The combination of individual and household poverty is referred to as micro-scale poverty (Bhorat, 1999). Most developing countries design poverty reduction strategies. Some strategies are in line with guidelines provided by international and multilateral organisations, while others are based on the countries' respective needs and requirements.

In Nigeria, various programmes by both private philanthropists and the government have been rolled out to reduce poverty's effects on individuals and households. The most recent one was the Subsidy Re-investment and Empowerment Programme (SURE-P), which targeted the youth, women and cooperative groups. Similar to all others before it, the programme was judged as unsuccessful (Nwosu & Ugwuerua, 2014)). Many more research studies investigating the failure of such empowerment programmes have so far concentrated on the programmes themselves, paying little or no attention to the beneficiaries or potential beneficiaries, in other words, the individuals or groups (Joseph, 2005; Onwe & Nwakamma, 2015).

This paper attempts to establish the successes or failures of the programmes by focusing on their intended beneficiaries. It conceptualises the poverty trap in terms of ripples or patterns that repeat in the form of concentric cycles at the patterning stages. The first one is the externalisation stage where the environment is involved and contributes to poverty trapping or meso and macro traps. The second stage is the internalisation of the trap by the person involved or the individual's internal mechanism that helps keep him or her trapped in poverty. With the knowledge of such an internal mechanism, training and knowledge development programmes could be designed to help individuals overcome issues that keep them trapped in poverty. Therefore, the importance of this exploration cannot be overemphasised in the light of current realities in poverty reduction research. Particularly, this paper aims to propose answers to the following questions:

Considering the interrelatedness of poverty factors, what are the implications of poverty at the micro level for the meso and macro levels?

To what extent do individuals who shift boundaries or conditions shape the way that poor people perceive themselves? What are such perceptions' implications for the poverty reduction strategy?

This paper conceptualises poverty as fractal in nature; it occurs in concentric patterns. This conceptualisation is used to investigate how individuals find themselves in poverty and the ways to get out of it. Section 2 examines some poverty literature. Section 3 reviews the fractal conceptual framework. Section 4 discusses various poverty trap theories. Section 5 relates poverty traps to fractal time, while section 6 discusses some poverty reduction strategies in line with fractal time framework, section 7 advances our propositions and section 8 concludes the paper.

2. Poverty Literature: Multidimensional Nature of Poverty and its Traps

To explain why poverty traps emerge, it is necessary to understand that poverty is multidimensional (Alkire & Robles, 2015; Alkire & Santos, 2011, 2013; Ravallion, 2011; Tsui, 2002). For example, this paper uses the United Nations Development Programme’s (UNDP) data on countries characterised by poverty and the following definitions UNDP (2015):

Multidimensional Poverty Index: This refers to the percentage of the population that is multi-dimensionally poor, adjusted by the intensity of the deprivations.

Multidimensional poverty headcount: This indicates the percentage of the population with a weighted deprivation score of at least 33%.

Intensity of deprivation in multidimensional poverty: This is the average percentage of deprivation experienced by people in multidimensional poverty.

Population near multidimensional poverty: This denotes the percentage of the population at risk of suffering multiple deprivations, with a deprivation score of 20–33%.

Population in severe poverty: This signifies the percentage of the population in severe multidimensional poverty, with a deprivation score of 50% or higher.

Contribution of deprivation to overall poverty: This represents the percentage of the Multidimensional Poverty Index attributed to the deprivations in each dimension.

Population below purchasing power parity (PPP) of \$1.25 a day: This score is the percentage of the population living below the international poverty line in the amount of \$1.25 (in PPP terms) a day.

Population below national poverty line: This represents the percentage of the population living below the national poverty line that is set by the authorities.

With these definitions, the following paragraphs provide quantitative estimations of poverty in the developing countries that are included in each chart (Figures 1 and 2). Figure 1 suggests the poverty levels in terms of the incomes (unidimensional poverty indicator) in selected countries for the year 2010. Madagascar ranked highest, with poor people constituting 95.10% of its total population (the poverty level meant an income of \$2/day). Next was Malawi, with 88.10% of its people in poverty, followed by Nigeria, with 82.20%. The countries with the lowest poverty percentages were Mauritius, Malaysia and Macedonia, in ascending order.

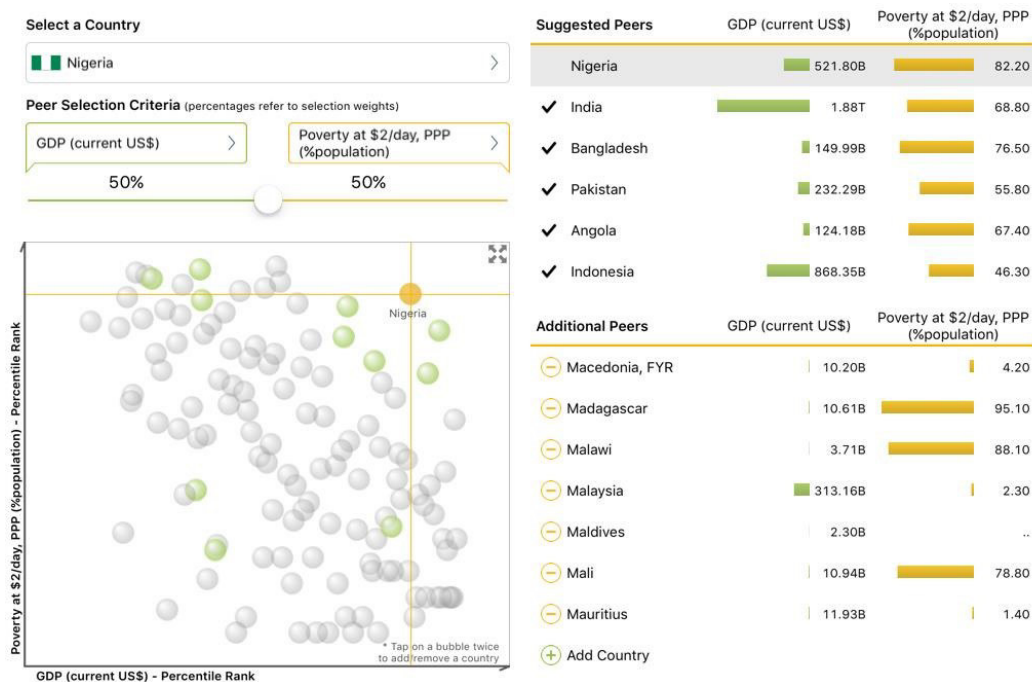


Figure 1: Unidimensional Poverty Indicators for Some Countries (UNDP, 2015)

However, these statistics cannot be true representations of poverty in these countries since the country with the highest GDP is ranked high on its poverty rate, while the country with one of the lowest GDPs has the lowest poverty level. Other factors are definitely at play here, which underscores the importance of multidimensional analysis. Figure 2 indicates the Multidimensional Poverty Index and the contributors to the index in selected countries.

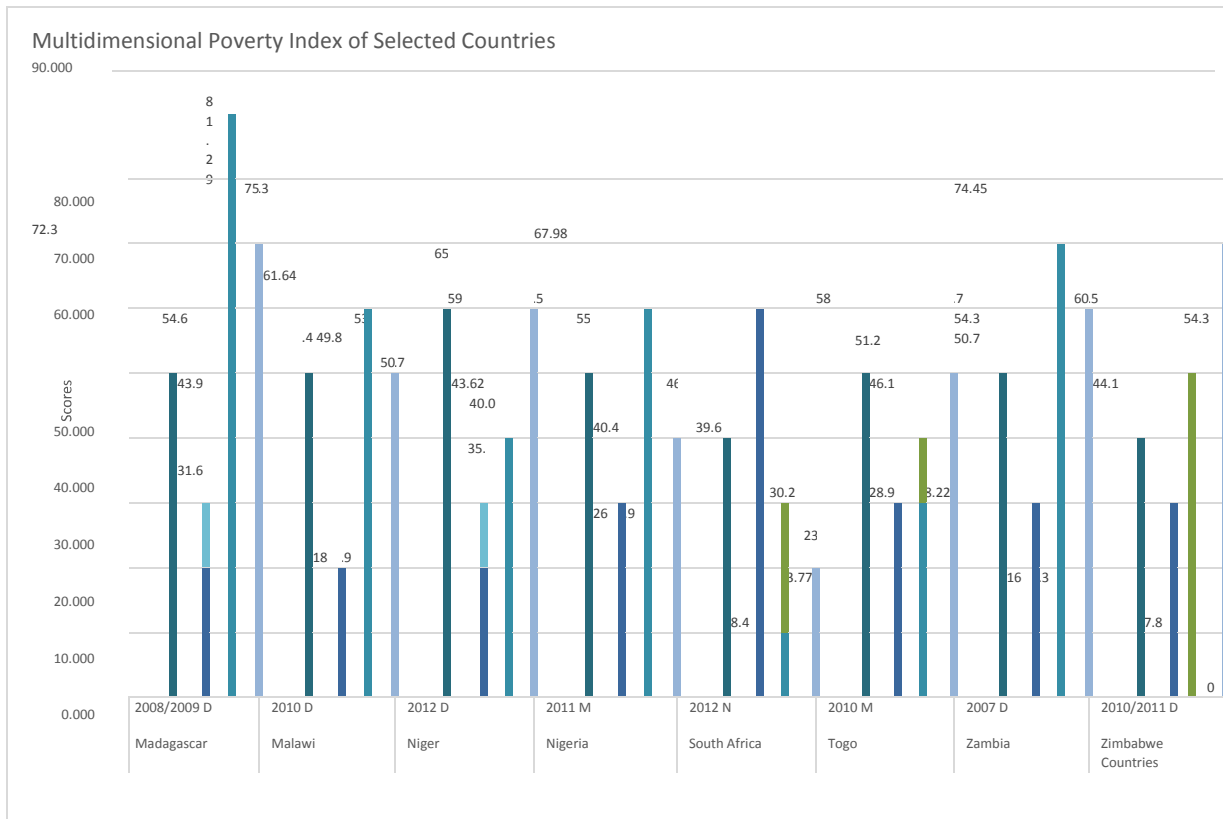


Figure 2: Multidimensional Poverty Indicators for some Countries (UNDP, 2015)

Figure 2 clearly shows that other factors besides income significantly contribute to poverty. For example, the poverty percentage for Madagascar dropped to 81.29. For Malawi, taking the same year 2010, its index decreased from 88% to 65%. The multidimensional index includes other indicators, as well as takes into consideration each country's national poverty line. This index shows that other factors are significant to the indicators. In Table 1, four African countries (Egypt, Ghana, Niger and Nigeria) are compared with two other developing countries (Brazil and China), taking the same years as indices for the poverty estimation comparison.

Table 1 clearly shows that all four African countries had higher populations in multidimensional poverty than the two other developing countries. For example, the percentage of Brazil's population in multidimensional poverty was 2.9% in 2013, lower than the figures in 2012 (3.1%) and in 2007 (4%). On the other hand, in 2013, the percentage in Nigeria was 50.9%, higher than what it was in 2011 (43.3%).

Table 1: Multidimensional Poverty Indicators for Eight Countries

Country	Year	Population in Multidimensional Poverty (%)	Population Near Multidimensional Poverty (%)	Population in Severe Poverty (%)
Brazil	2013	2.9	7.2	.4
	2012	3.1	7.4	.5
	2006	4	11.2	.7
China	2012	5.2	22.7	1.0
	2009	6.0	19.0	1.3
Egypt	2014	4.2	5.6	.4
	2008	8.9	8.6	1.5
Ghana	2011	30.5	18.7	12.1
	2008	39.2	20.3	15.4
Niger	2012	89.8	5.9	73.5
	2006	93.4	3.4	86.1
Nigeria	2013	50.9	18.4	30.0
	2011	43.3	17.0	25.7
	2008	53.8	18.2	31.4

2.1 What poverty is not: the poverty myths

From the statistics in Table 1, the following facts could be deduced. As indicated by other authors (Nwosu & Ugwuera, 2014), decades of poverty alleviation and reduction programmes have been ineffective in the developing countries, particularly in Nigeria. One reason is the manner in which poverty is considered, handled and treated in those countries. There are certain misguided beliefs about poverty, such that a poor person does not envision his or her children coming out of it. Some of the other myths or beliefs about poverty are discussed in this subsection.

Based on the experiences of one of the authors of this paper, the following myths about poverty must be understood and tackled first so that the poverty reduction strategy will be effective.

Poverty is an economic issue. This view predominates in most of the places where this paper's authors work. However, as Figure 2 indicates, poverty is not only about income; other factors are involved. Individuals and groups believe that poverty is rooted in the economic conditions of the individual or the community. However, experience indicates that although an improved economic status is a condition for poverty reduction, it is not all that is required. Indeed, it ranks low in the fight against poverty. This point is expanded in subsequent sections.

Poverty is based on culture. Some analysts indicate that poverty is culture dependent. Their argument is based on their understanding of dominant poverty-stricken communities, such as those in Northern Nigeria (Jones, 2010). Other scholars also indicate that the culture of corruption aids the spread of poverty (Ogwumike, n.d.). However, other analysts think differently (Collier, 2007). Collier (2007) believes that poverty has roots in factors other than culture, which is in line with the perspective of this paper's authors. After all, no civilization started rich. Human beings all started as hunters or farmers. To reduce poverty and get out of its trap, learning, adaptation and innovation are needed.

People living in poverty are lazy, uneducated, unskilled and weak or lack financial planning. This is not necessarily true since it is evident that some very skilful, highly educated people who plan their finances can also be found in poverty.

Reducing poverty requires social welfare. Another popularly shared myth is that to reduce poverty, charity is needed, either in the form of social work or philanthropy. Although as indicated elsewhere (Simmons & Birchall, 2008), people in poverty can cooperate to bring themselves out of poverty, and even institutions and governments can team up with poor people (Yunus, 2007), the myth that poor people must be helped out of poverty has in some ways restricted successful poverty reduction efforts. More recently, it has been argued that the welfare system is responsible for encouraging and supporting claimants in welfare dependency. The ways in which institutions, such as public or welfare delivery services, can negatively stereotype those experiencing poverty have also been shown as significant factors in stigmatising and disadvantaging these people.

Stereotypical culture of poverty. Poverty is often not considered as an outlier in the social system. Typically, certain classes of people are generally viewed as representatives of poverty. The public is taught to stereotype certain classes of people as poor. For example, not all Africans live in abject poverty, but Africans are generally regarded as poor in the Western world. This myth about poverty being rooted in some classes of people or in certain behaviours of people is not based on truth. Some individuals also attribute their poverty to God and are thus unwilling to make any effort to overcome it.

The greed causation. Can the greed of the rich deprive the poor? This is generally held as true by commentators on poverty. In some instances, the extent of the wealth of a few people compared to the poverty of many has been advanced as a reason. An example is the comment that 300 rich people have as much money as 2.5 billion poor people (See, for example, Phillips, 1990). This paper's response to this kind of remark is how have the rich acquired wealth? The myth that the poor are poor due to the greed of the rich should also be shed in order to eradicate poverty.

Poverty as developed countries' burden. Another myth that needs to be discarded is the developed countries' perspective that the burden of poverty is on them to solve. One of the leading poverty scholars remarks that it is not just giving the poor countries "[...] our money [...]" (Collier, 2007, p. xi) that will take them out of poverty. It is out of place to even believe that the advanced nations carry the burden of poverty and its eradication.

Escape from poverty. Governments, institutions and multilateral and other organisations have organised programmes to enable people to escape from poverty. The escape-from-poverty myth is the new buzz phrase in the fight against poverty. Often, the strategy is to focus on the poor in developed countries. It is based on the establishment of schools, delivery of motivational talks, offering welfare schemes, provision of shelter and addressing other welfare issues. In developing countries, these solutions are not tenable.

The preceding points do not comprise an exhaustive list of myths about poverty. Nonetheless, it is the authors' considered opinion that this list is important for individuals in developing countries.

3. Conceptualisation of Fractal Poverty: The Fractal Time Framework

The fractal framework leverages the patterns of repeated cycles to provide an understanding of conditions such as individual poverty cycles. The framework proposes that no matter how complex poverty becomes, it exhibits patterns that are similar and occur over time. Although time prevents events from happening all at once, time is also regarded as occurring in a quantum quantity (nano time) (Vrobel, 2011, pp. vii-ix), and human experiences give meaning to time. As such, time is subjective, and vertical and horizontal distinctions of time (time-space) are inseparable. An event could occur in a split second; as such, at any point in time, people are able or unable to determine what the next point would bring. Thus, based on the idea of the inseparable time-space logic, it is possible to know the future from the past. Time is also nested; so are patterns. The implication of the nesting of time for the poverty trap is that poverty levels cannot be separated, and one level can influence or compound another without really knowing what is happening.

Using the preceding summary, it is easy to place poverty under fractal conditions. First, it is important to realise that poverty occurs in patterns. It expands from the micro to the meso and the macro levels. In other words, a poor individual will likely breed poverty within his or her family and then in society. However, it is also essential to know the conditions that breed poverty and the length of time in which the individual stays poor. It may last for a long period, or it may be a short one. The conditions could also be nested; for example, those that cause an individual's poverty, such as health conditions, result from the lack or inadequacy of health facilities in

the individual's community. If an individual is unproductive due to illness, the community will bear the eventual burden and may not provide or sustain health facilities.

4.0 Poverty Trap Theories

This section introduces some theories of poverty traps. It is important to mention that economic development theories can be used as well to explain poverty trapping. The poor agents tend to follow roughly the same pattern when they transform from being poor to being rich and vice versa. They first get a boost in wealth somehow, which helps them advance past subsistence living (Collier, 2007). For example, they may have the opportunity to farm more valuable food than they ever did before or may receive seeds. They then earn the money necessary to make investments, further increasing their productivity and creating more wealth, eventually becoming rich. However, if the agents are never able to move past subsistence living due to some reasons or if they never invest but squander the wealth they receive, the result is that they are stuck in poverty, unable to attain food sufficiency and subsequently, productivity and economic development.

The following paragraphs, although discussing different theories, follow the same pattern to explain poverty traps.

- a. The ladder theory of economic development follows the standard neoclassical model of development (Sachs, 2004). It states that growth tends to follow the same patterns when individuals or countries transform from poverty to wealth. They first get a boost of wealth somehow, which then helps them move out of poverty or subsistence living. For nations, the help could be in the form of resource extraction, such as improved agricultural output, or it may be enhanced Foreign Direct Investment (FDI). Money then becomes available for improved services in healthcare and education, for example. However, if the countries obtain all these investments yet fail to improve their healthcare, agriculture and/or critical infrastructures so as to move up from the subsistence or poverty level, the result is that these countries remain in extreme poverty. Countries that are stuck in extreme poverty are characterised by different trends, including dilapidated infrastructures, poor healthcare services, conflicts/civil wars, corruption and many such ills. These factors make the countries poorer as FDI is repelled, workers are often sick, thus lowering productivity, and so on. The poorest nations become poorer as a result of cyclical activities. These symptoms of poverty, which mutually reinforce conditions, are called poverty traps.
- b. Poverty traps work in a self-perpetuating condition; thus, theoretically, a poverty trap is any self-reinforcing mechanism that causes poverty to persist (Matsuyama, 2005). There are two identifiable factors behind poverty traps among individuals. First, some people are born into extreme poverty and may have difficulty in accumulating assets. Second, some people suffer from adverse shocks, such as natural disasters and other stochastic consequences. An example is the El-Rufa'I phenomenon in Abuja, Nigeria, where in the effort to clean up the city, the items owned by roadside vendors were confiscated and destroyed, leading them to deprivation and ill health. The recent Arab uprisings have been sparked by a similar phenomenon in a Tunisian city.
- c. The poverty trap can also be viewed as a stable state (no growth) for a long period of time, with low levels of income and capital stock. If an agent attempts to break out of it, the situation tends to return to the low-level steady state.
- d. The notion of a trap emerges from the concept of multiple dynamic equilibria. Stability occurs at both high and low levels of productivity. In contrast to a single level of productivity, where growth paths point to an increased productivity level, multiple dynamic equilibria emerge as a result of the bifurcation of economic progress. One way to determine multiple dynamic equilibria is to observe the asset dynamics. Several authors (e.g., Sindzingre, 2007) discuss the concept of endogeneity of low equilibria, where individuals sense that they lack something internally, weighing them further down.
- e. Poverty dynamics must also be considered in terms of the individual or the economy. Poverty can be transitory, or an individual can remain poor for a long period of time (Sachs, 2004). An individual or an economy can suffer or even choose to engage in activities that result in income losses, pushing

them below the poverty line for a brief period of time. They may recover without external assistance. The individual may also remain at the poverty level for an extended period of time.

- f. The poverty trap is distinguished from poor market outcomes. Poor market outcomes result from recessions or financial crises. These are transitory, and the economy could recover, even without external assistance. In microeconomic considerations, an individual in transitory poverty can recover from poverty shocks relatively quickly. It is not the magnitude but the nature of the poverty that differentiates how individuals or nations become trapped in poverty.
- g. Despite the difference between market failures and poverty traps, some schools of thought mention the relationships among poverty traps, markets and institutional failures (Chantarat & Barrett, 2008). These failures lead to inefficient technology adoption and corrupt governance. For example, corruption can generate incentives, which reward more corruption.

5.0 Applying Fractal Time Principle to Poverty Traps: Fractal Poverty Traps

Poverty occurs at multiple scales among individuals or groups. From the various theories reviewed in the preceding section, poverty is a result of nonlinear processes that cause the coexistence of high and low equilibrium levels and incomes and high and low rates of growth in the individuals' finances or even in the nations' economies. A couple of authors indicate that multiple equilibria occur due to the lack of activity coordination or market failure (Matsuyama, 2005; Sindzingre, 2007). In the fractal poverty trap, multiple dynamic equilibria simultaneously exist at the meso, micro and macro levels. These dynamic equilibria are self-sustaining through feedback effects. For example, the poor health of individuals will have a feedback effect on the economy of the community and eventually of the country. However, poor health is also a resultant feedback effect of the lack of health infrastructure in the country.

As a special nature of the poverty trap, the fractal poverty trap involves multiple dynamic equilibria that exist simultaneously at the scales of poverty analysis and are reinforced through feedback effects. The low-level equilibrium prevailing at one scale makes the high-level equilibrium inaccessible at the next lower scale and vice versa. For example, an individual is unable to collect certain payments for services rendered because the customers are unable to pay him or her. The individual may eventually be unable to grow his or her business or even to afford the day's meals. The resultant low productivity level due to the inability to invest or grow the business or even provide the same services due to hunger or ill health leaves the person further down in poverty. Similarly, if the person lives at the subsistence level and because of government corruption, cannot acquire services from the state (such as healthcare), then the person is unable to save, may plunge to persistent poverty due to his or her need for medication and so on. Another case of the fractal poverty trap is that a farmer who has herds of animals may have community-scale problems and in the process, sell off the herds to solve the problems. The trap can also be observed when there is persistent drought over a period of time, resulting in hunger and consequently, animal deaths. The trap can also involve the lack of coordination among various agents, resulting in farmer-herder clashes and the deaths of several animals. These examples explain multiple equilibria at different levels or in various patterns. At different scales, individuals encounter traps that push them into poverty and hold them there for a long period of time. The sets of constraints lead individuals to remain at the lower levels of poverty. These have spillover effects on both individuals and communities as the constraints create self-reinforcing feedback loops. Small adjustments at any level are highly unlikely to move from the dominant stable equilibrium stage. In such situations, individuals, communities, governments and markets are simultaneously weak in such places. All agents operate at lower levels of equilibrium. Similar to the fractal time framework, past patterns can persist and repeat themselves even after the original sources are gone.

The challenge now is to find ways to simultaneously improve asset accumulation at various scales.

5.1 Poverty trap patterning

Consider this paper's hypothesis for fractal poverty traps, which is based on other works (Izhar, 2005). The variations in the outcomes of poverty dynamics within units, from the individual onward, result from the differences in the following:

- a. initial asset holding;

- b. multiplication ability of available assets, such as technology, markets, environmental conditions and so on;
- c. available sunk-cost items, such as expenditures, taxes, institutional corruption and so on; and
- d. internal and external factors, such as coordination, cooperation, conflicts, individual cognitive traps, among others, that affect the organisation of the production function.

All of the above factors indicate that the outcome of variations among different agents (e.g., individuals and communities) that tend to have better coordination and cooperation is likely less poverty (Collier, 2007). At the macro scale, the fractal nature of poverty traps is more visible since some regions, such as Africa, central Asia and so on, are characterised by widespread poverty. The ripple effect or pattern growth is more disabled and clear in these regions. Economic performance and other issues, such as environmental problems, corruption and over-population, are often used to explain poverty traps at the scale of nations. Each of these explanations fits the fractal poverty trap framework. The meso scale of analysis involves communities, groups, networks and local jurisdictions. At this level, coordination and cooperation are often the important factors in tackling poverty (Sindzingre, 2007). These are significant determinants of asset accumulation, transformation of assets into goods and services, and distribution of these goods and services among units. If there are linkages among institutions, and interactions among units and among scales are enhanced, the local economy settles. However, these phenomena are not restricted to the meso level.

However, at the micro level, the focus is on individuals and households. Individuals and households remain in persistent poverty because they are often not in a position to find their vocations or be employed. Some authors offer another viewpoint; individuals are in poverty because of their lack of skills in engaging in lucrative ventures or their inability to choose enterprises that are feasible enough to take them out of poverty (Berg et al., n.d.; Borhat, 1999). An initial asset holding, as indicated in several sources (e.g., Gore, 2003), underscores its importance in overcoming poverty traps. Simply stated, initial conditions matter. Individuals with few or no assets at all are unlikely to venture into remunerative economic activities. The most extreme cases of micro-scale poverty traps are those that are irreversible. These are due to the lack of individual will, skill and education; illness; the absence of basic amenities; and other adverse conditions during childhood (such as malnutrition, childhood violence and so on). Malnutrition can lead to permanent reduction in physical stature or delay in other forms of developmental characteristics, such as cognition. These in turn lead to involuntary employment and lower income in adulthood. These constraints can further spread and cause under-investment in children and as such, propagate poverty from the micro to the meso scale and so on. At the same level of argument, poor health and low education weaken labour productivity and the ability of communities to come out of poverty.

6.0 Poverty Reduction Strategies

In this section, poverty reduction strategies that are consistent with the fractal time framework and in line with propositions made in section 1 of this paper are briefly discussed.

6.1 Individual cognition as poverty reduction strategy

This paper focuses on how to reduce poverty at the micro scale, that is, at the individual scale. It has already been explained that although various empowerment strategies are devised by private philanthropic undertakings and official government policies, these are often temporary measures, and individuals return to poverty after some time, the so-called poverty relapse. This paper proposes other methods and strategies based on the fractal time framework. The focus is to examine the proposition presented in Section 1. To do so, this section answers the question of what makes trained and empowered individuals relapse to poverty after some time. In other words, although the required initial assets are provided, why do individuals slip back to poverty?

The fractal time framework indicates that time is regarded as spanning fast-shifting events that repeat themselves. As boundaries or conditions shift, individuals who have experienced their first freedom from poverty engage in actions and activities that lead to relapse. Upon individual empowerment, they notice changes in their living conditions, offering them some power or what is termed as proprioception (Vrobel, 2011, pp. 59–89). To these individuals, it may seem as if they have already grown out of poverty. The following possible interfaces may be deduced. First, these individuals are now able to indulge in expenditures that were not possible in the past. Second, as a result of the ability gained by empowerment, an internal feeling of accomplishment materialises within each individual – the feeling of “I can do it”. Third, the individuals may probably spend more

than their savings; as a result, asset narrowing instead of asset widening occurs. Finally, the individuals may engage in liability expenditure to reinforce their new status.

These four elements may occur to the individuals and may interface to be compounded and to plunge them back to poverty. These elements have two conditions: internally, the individuals perceive their accomplishments; externally, others perceive a sense of belonging. These two conditions have ripple effects on the individuals. Externally, as they may spend on frivolities, they may get involved in unhealthy activities, thereby becoming unproductive to themselves and to the community. The individuals may also engage in negative activities that may be injurious to the community in general, such as criminality, so as to catch up with their chosen way of life. Internally, the feelings of importance or trying to belong may be responsible for the excessive expenditures that the individuals are unable to maintain.

These shifting conditions between boundaries (poverty and out-of-poverty) make the individuals perceive themselves as different or between two worlds. Subsequent actions and activities move the individuals below or above the dynamic equilibrium. For example, as their social status moves up, they may incur expenses that are far beyond their means; as such, they are left with no savings. With their shifting conditions, they may attempt to be different by changing their behaviours, including eating habits and others. In this situation and in the absence of facilities and infrastructure, such as healthcare services, the individuals' expenditures may exceed their savings. These conditions interface with one another to complicate individual circumstances and to fling the individuals back to poverty or even below the poverty line.

The implication of this hypothesis is that individuals who previously could not do certain things suddenly accomplish them; they tend to extend their access or to reach the far space in addition to their near state (Vrobel, 2011). The individuals tend to remap the far space to the near space. A part of the external environment that is beyond the individuals' reach is perceived as within reach, and the individual brain interprets the chance as an extra leap. This recalibration process does not necessarily mean that the individuals will not succeed, but experience indicates that they often fail. The reason is that the perceived accomplishment is not real but a result of the individuals' cognition. There is an illusionary perception of importance, both internally (through extra spending) and externally (may be family responsibility). Boundaries now shift again. Thus, cognition (in the form of illusionary perception of importance) and action erase the temporal structures and plunge the individuals back to poverty. To help them out of poverty, another hypothesis is presented in the next subsection.

6.2 Synergetic analysis as poverty reduction strategy

One way to help is to employ synergetic analysis. Synergetics is concerned with the cooperation of individual parts of a system that produces macroscopic spatial, temporal or functional structures (Haken, 1980). Poverty can be approached from the perspectives of both endo- and exo-causation or upward and downward causation that are nested in a complex way to produce a prolonged condition of deprivation and want. The upward direction is the local to the global causation from which novel dynamics emerge and through feedback, further degrades individuals. The downward direction is the global to the local causation, whereby a global order or policy enslaves individuals and effectively weighs them down to persistent poverty. The synergetic system is self-organised such that each of the parts causes the behaviour of the whole. However, it is also important to note that the whole also constrains the behaviour of the parts.

The boundary between the outside and the inside is thus blurred. Thus, the hypothesis presented here is that for individuals to fight poverty from within, the concept of choice points and/or leverage points (Meadows, 2009, pp. 145-165) is helpful. These are points within the system that produce more of what individuals want and less of what is undesirable. Individuals must be able to understand their respective choice points and leverage these with appropriate knowledge to fight the choice points. To locate the choice points, three stages may be advanced. First, individuals should clearly separate the external from the internal. What are the meso and the macro poverty causations? In other words, what is the role of externalities, such as the government, in causing poverty? Often, individuals in poverty blame the state for every situation in which they find themselves. In countries such as Nigeria, individuals expect all aspects of their being to be totally dependent on the state. This stage clearly expects individuals to be reflexive and to distinguish between what they can do to help themselves and what the government or the state can do to help them help themselves.

At the second stage, individuals must strive to surmount any obstacle that they must have realised as blocking their progress or weighing them down in poverty. At this stage, individuals do not perceive any separation between them and prosperity. The answer to this separation lies within individual cognitive processes. In contrast to the argument where choice points are identified and avoided, in this case, to succeed against poverty, choice points must be identified and a cognitive mechanism must be developed to harness or leverage the advantages or

the opportunities offered. Various research works have indicated how such cognition processes could be developed (Baron, 1998; Bonini & Egidi, n.d.)

At the final stage, individuals may move towards internalisation of the external factors. As individuals are enabled to identify the external and the internal factors that are responsible for driving them to poverty, they may consider the two factors as a single capital factor and push towards solving the two together.

7.0 Building a Future without Poverty: Another Proposition

Previous sections have discussed poverty from the micro viewpoint and have expanded on the concepts that trap people in poverty. This section gives a general solution that involves individuals and society in the fight against poverty.

In developing countries, such as Nigeria, poverty eradication strategies are often made the responsibilities of institutions, and strategies are designed to help the poor. Generally, the adopted poverty reduction strategies include information technology, education, healthcare, agriculture, livestock, renewable energy, marketing, entrepreneurship, financial credit and other activities (Yunus, 2007). This section briefly explores some of the strategies that have not been in focus. This is in line with the authors' recent experiences in government and individual poverty reduction programmes.

7.1 Right strategy for poverty reduction

As indicated in Section 1, over more than five decades, different poverty reduction programmes or strategies have been adopted and used, particularly in African countries. However, it will not be out of place to state that these programmes or strategies have been ineffective. Poverty, either in the unidirectional or the multidirectional context, has continued to ravage countries in the third world, especially in Africa. This section provides a new proposition based on individual attribution. To fight poverty, the global approach may not be effective. For the fight to be right, it has to be local. Developed from the authors' experiences, Figure 3 is context specific and based on the individual.

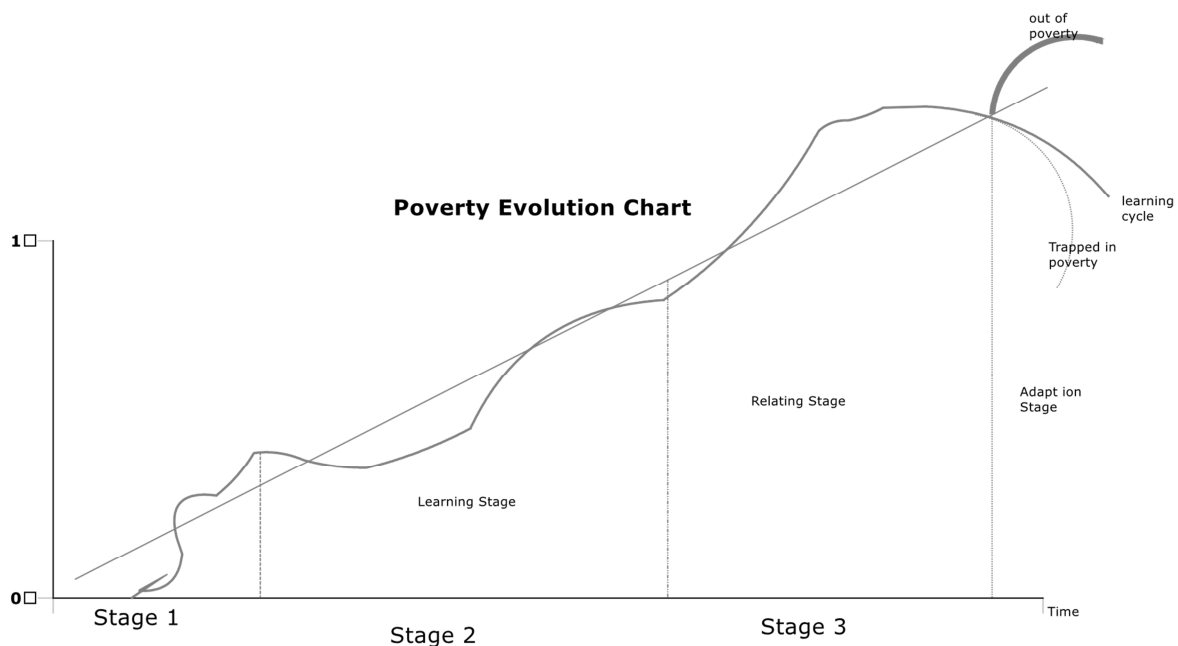


Figure 3: Poverty Evolution

At most, there are four stages in poverty evolution; understanding these stages is necessary in a poverty reduction strategy in whatever context is considered. **Stage 1** is the experience stage when the individuals may not have started any poverty elimination/reduction effort. At this stage, the individuals may be growing up within the vicinity of a trade or a vocation or may be apprentices or in school. **Stage 2** is the learning stage when the individuals are in and out of poverty, trying different vocations or trades. In **Stage 3**, the learning stage transitions to the relating stage when the individuals find a way out with a trade or a vocation and become stable. Becoming stable does not mean that the individuals are finally out of poverty. As experience indicates, the factors (at this point, the individuals feel that they have arrived) often set in at this stage and spur the individuals

into unnecessary spending. To acquire more wealth, they may try other vocations or trades that they have no knowledge about or are inappropriate (sometimes illegal, such as smuggling) and in the process, fling the individuals back to poverty. Relating may also mean adapting to one or several vocations or trades that may permanently bring the individuals out of poverty. The relating stage may also be the stage when the individuals are trapped permanently in poverty or follow the poverty evolution cycle all over again.

Based on the preceding discussion, the Learn, Relate and Adapt (LERA) Model is proposed as the poverty reduction baseline model focusing on the individual (Figure 4).

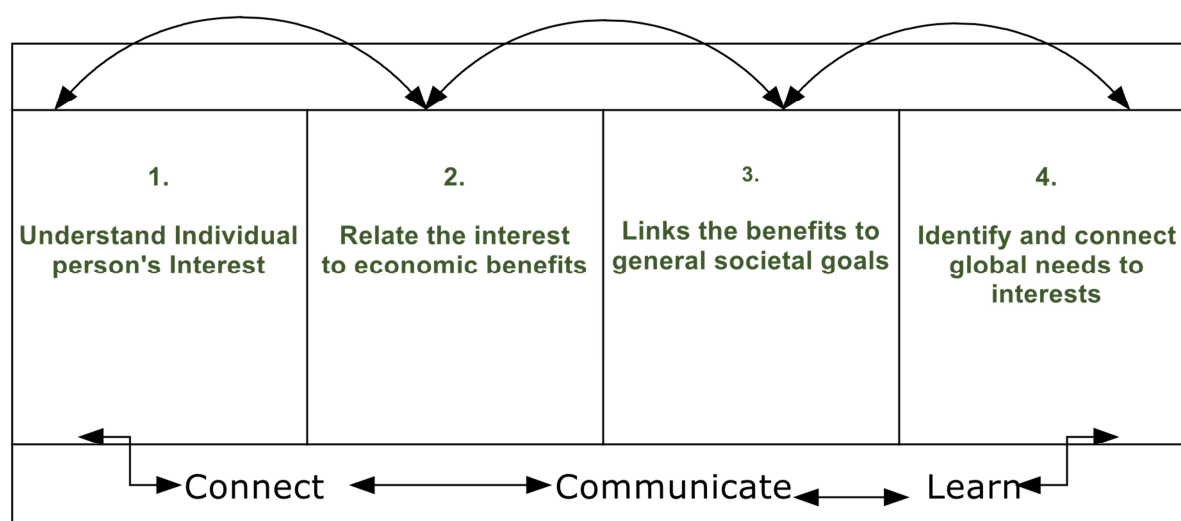


Figure 4: The Learn, Relate and Adapt (LERA) Model of Poverty Reduction

The LERA Model consists of four stages, from the stage of poverty to the poverty reduction maturity. Importantly, the model takes into account that individuals live in society and produce value for society. For individuals to be effective, the value that they produce must be effective for society. If on one hand, services or products are produced but not consumed, then the individuals producing them have not been productive. The significance of this point is that every aspect of someone's interest is also interesting to another person or other persons. Therefore, the first point or Stage 1 forms the individual's interest. To help the individual come out of poverty, it is important to channel energy into making the individual's interest productive to him or her and to society. Therefore, understanding the individual's interest is paramount. At Stage 2, these interests are then related to local economic benefits. In what ways will the things produced by the individual become economically beneficial to society, that is, to others within his or her society? Stage 3 aims to link related interests to the general or overall goal of the community, the state or the nation. Finally, Stage 4 is when the developed products/services are ready for the global market. The interest is not in global needs; rather, it is in creating global interest in local abilities. In other words, local interests should create a global focus. It is also significant to note that a single individual's or group's interest is insufficient to be transformed from the local to the global scale in the stages described. The global market's requirements may be a composite of products or processes that may involve groups or individuals working independently. However, a hub and its spokes in the relationship could be established. Cooperatives work in a similar way to fight poverty (Simmons & Birchall, 2008). An individual or society could also be trapped in poverty due to wayward neighbours, associations with conflict/violence, inefficient governance, the natural resources trap, the health trap and the weapons and goods or products trap, but it is always the internalisation of all the weights that makes a person poor (Carter & Barrett, 2005; Kraay & Raddatz, 2007; Matsuyama, 2005).

8.0 Conclusion and Recommendations

After several decades of poverty eradication and reduction programmes, it seems that the global brain is trapped in the reduction strategy for developing countries, particularly where poverty appears to be endemic. There is a need to shift strategies to understand that poverty grows in cycles. Poor people hardly come out of poverty at their first attempt. However, they need to be shown how to come out of poverty by converting their experiences

into learning and adapting. In line with this, the LERA Model is proposed, based on the individual in the community. First, individual interest forms the core consideration. This interest is certainly local. However, it can be global, in line with societal and national aspirations and goals.

The concept of poverty is also considered in relation to the fractal time framework. The framework approaches poverty as forming concentric cycles that repeat at different scales or levels. It is clear from the discussion that micro-scale poverty has been the albatross of the poverty trap research and should be explored in detail. The concept of synergetics is used to explain how individuals make a successful transition or remain trapped in poverty.

Emphasising repeating patterns, the fractal poverty trap framework can be used to reduce poverty by leveraging the individuals' choice points to take them out of poverty. The public agencies in countries where fractal poverty is noticeable must be in a strong position to eliminate or move the threshold for a sizeable number of individuals and communities. This approach can be best achieved through investments in utilities and services, not in social welfare. Additionally, effective safety nets for individuals should be established, such as training and education on how to keep out of poverty.

There is a need for the decentralisation of poverty reduction programmes from the meso and macro scales to the micro scale.

8.1 Recommendations

In addition to the LERA Model of strategy reduction, other issues must be explored and handled appropriately. Some of these are discussed below.

8.1.1 Appropriate human and social development

As indicated in much of the literature on poverty reduction (e.g., Yunus, 2007), human and social development issues are vital. However, scholars often wonder what these issues entail. It is these authors' opinion that although important, these issues have not been properly considered and known in most places where poverty is endemic. For example, what aspect of social development stops an individual from political thuggery? Why can individuals who cannot afford a good meal afford substances or drugs to abuse? These issues are context specific and have been properly discussed in the literature in relation to some contexts (Collier, 2007; Sindzingre, 2007; Yunus, 2007).

8.1.2 Right understanding of poverty trappings

The literature has also discussed how individuals and societies end in avoidable trappings. Such trappings include those that are inherent in globalisation and global capitalism. Therefore, it is necessary to understand what exactly plunges individuals and societies into poverty. This issue is also context specific and has been extensively explained by other researchers such as Shaffer (2001).

8.1.3 Systematic contradictions

To fight poverty, systematic contradictions among individuals, communities, societies and nation-states must be resolved. For example, an individual who is willing to fight poverty must be able to practise healthy living. In most societies, the people living in extreme poverty are promiscuous. This promiscuity leads to diseases and as such, weakness and inability to fight poverty through ingenuity and innovativeness. Poor women are most likely to give birth to many children whom they cannot train or provide for adequately. Contradictions are evident in society and communities as well. For example, in most of the government programmes studied, the poor people are not involved in planning the programmes; as such, they do not regard the programmes as theirs but as something forced on them.

8.1.4 Global development as delusional fantasy

The literature on globalisation and poverty is increasing, with the focus on globalisation's impact on poverty. However, there are many questions to answer, such as whether globalisation makes countries rich. If it does, what is its impact on the citizens? Although some authors argue that globalisation helps countries tackle poverty (Wade, 2004), others contend that it compounds poverty in developing countries (Shiva, n.d), and some state that it does both (Harrison, 2006). However, from the literature and the experiences of this paper's authors, globalisation makes the poor poorer, the rich richer and the middle class rich. The irony of globalisation is that the rich benefit; in the process, they engage the middle class, particularly the highly educated, to find innovative

ways to acquire wealth. The members of the middle class are paid for their innovative inputs, whereas the poor are displaced from their jobs and have less and less resources (natural and material) at their disposal. In the end, the concept of the poverty trap sets in. The nation-states evaluate their incomes in terms of GDP and declare more income per capita and thus increased wealth, while their citizens continue to languish in poverty. It is thus essential to devise globalisation with a human face.

8.1.5 Escape from traps

When discussing poverty, it is important to examine not only the factors that make people poor but also related aspects, such as those that drag other people into poverty because some are already poor. For the individuals, the poverty evolution cycle is helpful. Consider Figure 3; in Stage 1, the individuals are becoming better off in absolute terms as society and the individuals regard learning at best. It is also the case in Stage 2. In Stage 3, the performance becomes worse. This stage is one of individual volatility; some learn, relate, adapt and go up, while others who fail to do one of these three tasks are likely to go down. All the three concepts of learning, relating and adopting are context specific. For the individuals, the LERA Model of poverty eradication is thus proposed.

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