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The Ant Model: God's Framework for Sustainable Institutional and National Development

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ABSTRACT

God has provided sufficient information to guide our relationships, socio-economic wellbeing and enhance our productivity. He communicates with mankind through the Bible and nature. Urbanization and the new-age civilization is, however, eroding qualitative nature study. This paper examined the challenge recorded in the book of Proverbs 6: 6-11 and analyzed the model that God has deposited in the ant for sustainable development. The scope of the paper covers analysis of the model's framework and its application to leadership, communication, and conservation as drivers of institutional and national development. The study focuses on the key goals of the ants in sustaining and developing the colony through building and maintenance of the anthill, achieving inclusive system of colony governance, and ensuring food security and security of the colony. The principles underpinning these goals were identified and their application to human system discussed. The activities of the ants in trail formation, communication using pheromones, and conservation of food and building materials were particularly examined. Based on the analysis of the model, the paper concludes that effective communication, servant leadership, focused planning, subordination of personal goals, unity of purpose, application and preservation of biblical culture are *sine qua non* to achieving the identified development goals and ensuring institutional and national development.

Keywords: Ant Model, Communication, Conservation, Leadership, Sustainable Development

Introduction

Human society is plagued by socio-economic problems including corruption, bad governance, food insecurity, insecurity of life and property, poor educational systems and so on. Each of these challenges has formed topics for debates and research over the years, culminating in the formulation of several social and economic theories and models, yet, the problems persist. Many of the laudable theories and models projected for sustainable development have even been criticized as mere idealism. It seems the more we try to forge our own models for social interactions and governance, the more we experience failures in the long run (Proverbs 14:12).

The critical question then is, 'what is missing in the equation'? Perhaps, it is high time we looked into nature's book for the missing variable.

Nature is a significant information database recognized by Bible writers, scholars, and philosophers. Galileo (1615), an ancient Greek philosopher, attested to the fact that God is known first through nature, and more particularly, through His inspired Word. Many African indigenous proverbs and folklores derive from nature studies. Some materials from nature which have been used to teach strong moral, social, and economic lessons are still being used as symbols of institutions. For example, lessons of selflessness and strength learnt from the eagle are the key reasons for selecting the bird as a national symbol in Nigeria. Many years ago, God turned the attention of King Solomon to the ant system, and this inspired the poem in Proverbs 6:6 – 11:

*Go to the ant, you sluggard [lazybones];
observe its ways and be wise!
It has no commander, overseer, or ruler,
yet it prepares its food in the summer;
it gathers at the harvest what it will eat.
How long, you sluggard, will you lie there?
When will you rise from your sleep?
A little sleep, a little slumber,
a little folding of the hands to relax,
and your poverty will come like a robber,
and your need like an armed man (NET)*

This paper examined the challenge God posed to King Solomon, as recorded in the passage, and analyzed the model that God has deposited in the ant for sustainable development. Qualitative lessons on leadership, project management, sustainable food management, effective communication and mentorship are drawn from the social and economic system of the ant colony.

Brief Background of the Ant and the Colony

Ants are popularly known as social insects because they live and work together in highly organized societies called colonies. The ant belongs to the family *Formicidae* which are part of the order *Hymenoptera*. This means they are actually related to the wasps and honey bees. Ants are the most dominant component of terrestrial habitat; hence, they can be found everywhere (Mahalakshmi & Channaveerappa, 2016). There are over 12,000 species of ants all over the world (Agosti, Majer, Alonso, & Schultz, 2000). Each colony may have up to 300 million ants made up of the queen and king who live most of their lives in the castle, called the anthill, soldiers and several types of workers who are sterile and blind. The worker ant, though the smallest in size, does the most work, rarely sleeping but never complaining (Ant Ark, n.d). The ant system is very advanced and organized in terms of the architectural skills, communication

system, leadership structure, defense protocols and food conservation strategy (Marco, Vittorio & Alberto, 1996). God has invested much information in this simple, lowly creature.

Communication System of the Ant

Despite the large population of ants in a colony, communication is never a problem. Each colony has a unique system of communication known to every colony member but different from alien ants (Hojo *et al.*, 2015). This way, they are able to detect strangers and danger. The ant employs sound, body language, touch, and most especially the pheromones to aid communication.

The ants can effectively communicate a wide range of information relating to food, colony business goals, building plan, antiques of competitors, marriage and sexual proposal, grooming or tutelage, and danger signals (Holldobler & Wilson, 1995). The worker ants produce pheromone trails to food sources for other workers to find and follow. When a worker ant has found something useful, it will run back to the colony, secreting pheromones which it leaves on its trail to guide other workers. It also provides them with a relatively clear image of what they should look for at the end of the trail. If the first ant has found something edible, it will most likely give the other ant a taste of it from a sample out of its mouth. When a worker ant meets a member of its colony, they communicate by moving their bodies in a specific manner, or simply by the touching of antennae. Studies have shown that the ant can mix and vary these signals in different ways (Holldobler & Wilson, 1995; Douwes, Abenius, Cederberg & Wahlstedt, 2012). Some species of the ant also produce low resonance sounds by rubbing their legs on their body to call for help when trapped or in distress.

Food Foraging among the Ants

Ants are capable of complex problem-solving strategies that could be widely applied as optimization techniques (Li *et al.*, 2014). To feed the queen and the rest of the colony, worker ants often forage for food especially at night (between sunset and midnight), traveling up to 91 meters from their nest to find food. When the ants encounter difficulty in finding food, instead of giving up and going home, they simply increase their search range, even taking on more risks in the process. Unfortunately, human beings tend to take the opposite response to setbacks.

As earlier highlighted, when the worker ant leaves home in search of food, it leaves behind a trail of pheromone so that it can find its way back home and for others to locate it. The foraging ants walk about aimlessly until at least one of them discovers a food source. Through random interactions, the location of this new information spreads quickly, and very soon thousands of ants converge on this food source (a radical change from randomness or chaos to order) and begin transporting bits of it back to the colony. The soldier ant quickly forms a wall to protect the trail formed by the workers carrying the food home. As they march home with the food, the leading ant keeps dropping the pheromone to reinforce the hitherto created trail. If an ant trail is disrupted or broken, the soldiers quickly forms a cluster around the workers carrying the food at

the point of the interference so as to ward off the predator. Once they sense the danger has subsided, another worker takes up the leadership role and navigates to connect with the workers who have gone ahead of the danger. The food foraging model of the ant has stimulated computer engineers to develop the ant colony optimization (ACO) technique to solving problems in the telecommunication industry (Kaushal, 2012)

Construction of the Anthill

Ants build their homes in all sorts of places. Many species dig underground nests and/or build mounds of soil. Ants are excellent architects and civil engineers. Most ant species use tiny sticks which they mix with mud or clay to build the anthill, thereby giving the building strength (Al-Ajmi, Abdalla, Abdelghaffar, & Almatawah, 2016) and protection from adverse weather conditions and predators. This is similar to what ancient Egyptians used for building their houses and temples (Exodus 5:7). Oftentimes, the soil contains seeds, which sprout and grow on top of the anthill, effectively disguising its shape and appearance. All anthills are interlaced with many chambers which are connected by tunnels. These small rooms are used as nurseries, food store and resting places for the worker ants.

The Ant Model

The ant model is constructed based on the highly developed organizational structure and functioning of the ant colony (as presented in Fig. 1). The model describes four major goals for sustainable development following the major processes in the ant colony. These include human capital and infrastructural development (which aligns with the focus of the ants in building and maintenance of the anthill), ensuring good governance, ensuring security of life and property, and achieving food security.

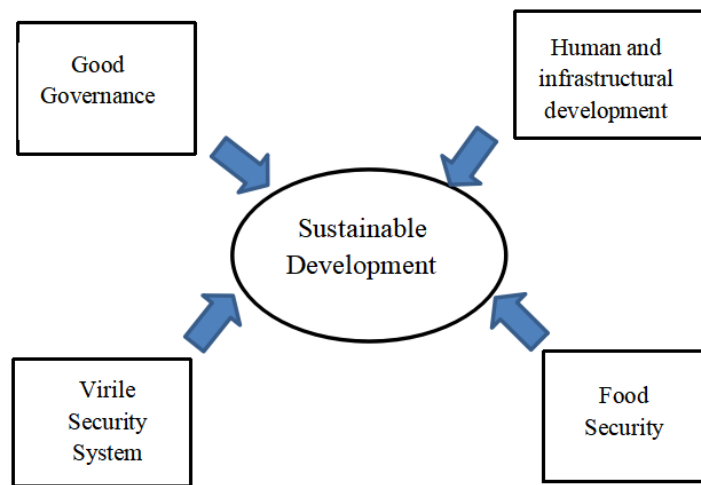


Figure 1: The conceptual framework for the ant model

This paper analyzes the methodology employed by the ants in achieving these four key processes or goals (See Figure. 1). As these goals have sustained the ant colony or system, they are also essential to achieving sustainable development in the human economy or society. Thus, the ant model provides a framework for identifying the principles underpinning these processes in the ant colony and their application in human systems in order to achieve sustainable development.

Human and Infrastructural Development

Ants are particular about the design and the materials used in the building of the anthill. Their focused and careful planning suggests the existence of corporate objectives which have been communicated and unitedly adopted by all the workers in the colony. This is similar to the concept of Management by Objective (MBO) popularized by Drucker (1954). It suggests that objectives should not be imposed on subordinates, but should be inclusive and decided collectively (Akrani, 2010). This gives popular support to these objectives and facilitates their achievement. Each ant feels directly responsible for the completion of the ant hill according to specifications. In searching for building materials, each worker ant is motivated to broaden the scope of its search and consistently communicates with others for collaboration (irrespective of their age or status), especially when a stock of supply is found. The application of this approach to building management ensures innovativeness, risk taking, and overall optimal productivity of the worker ants. This principle, if applied to resource management (whether human or material), is expected to optimize resource productivity and ensure sustainability.

Sometimes in the process of carrying heavy materials, the worker ants have to share the responsibility of haulage with one another. The strength of one complementing the weakness of the other enables them to lift objects several times larger than either ant. This principle is stated in Ecclesiastes 4:9-10 where Solomon, having learnt from the ant as instructed by God, emphasized the importance of cooperative effort, interdependence and collaboration. Organizations that adopt this principle are able to remove rivalry, build synergy and *esprit de corps* which is one of the 14 administrative and labour management principles posited by Henri Fayol (2013).

Ensuring Good Governance

The ant colony is able to maintain organizational wisdom, solution-oriented education and sustainable development of quality leaders through a unique system of knowledge transfer between the older ants and the younger ones (Agosti *et al.*, 2000). Thus, they maintain their culture, skills, practices, and general governance system by transmitting information from one to another through the unique system of communication via pheromones (Marco, Vittorio & Alberto, 1996). The ant queen is fertilized by the king, and soon she gives birth to a new team made up of workers, soldiers, another potential queen and king. They all get their training by sharing with the older ones and become well equipped to start another colony in a new location (Holldobler & Wilson, 1995).

Ability to use trend analysis and understanding of times and signs of danger is a major strength of the ant colony. By this, ants are able to survive conditions that destroy other insects. In the Bible, among the supporters of embattled David were the children of Issachar. The account in 1 Chronicles showed that the children of Issachar, like the ants, were endowed by God to be men of great understanding of times and direction (1 Chronicles 12:32). Despite the fact that they were very few in number compared to other groups, their skill was very instrumental to the success of David's administration. Similarly, strategic planning at both national and institutional levels will be more effective using the ant model. The ants approach problems-solving by learning from the past (as the younger learns from the older), anticipating challenges and formulating appropriate mechanisms to avoid them (Low, 2011). By divine endowment, the ants are able to develop a simple corporate goals and mission statement which focuses primarily on survival and sustaining the colony. They are also able to easily transmit these goals to all stakeholders via the unique pheromone communication system. Each member connects and develops individual goals and mission statement that align with the corporate direction (Gordon, 2016).

It appears that the ant economic system follows the adaptive expectations theory, which holds that people form their expectations about what will happen in the future based on what has happened in the past (Mlambo, 2012). One weakness of the adaptive expectations theory is that expectations may fail due to information asymmetry at the time expectations were formed causing information shock. The ant economy rarely suffers from information shock. Despite obvious changes in times and seasons, God has given them the ability to make intelligent and optimal forecast using all available information. Thus, they are able to make appropriate preparations for the future. This is more like the assumption of the rational expectation theory advanced by Gertch (2007). The same God who programmed the ants to align with this framework gave the children of Issachar their ability to understand times and seasons, and is, through Proverbs 6: 7-11, directing leaders and policy makers to learn from the ant.

Every nation or system that decides to use the ant model should be confident that the youth will be ambassadors of the norms, tradition and beliefs of the founding fathers wherever they go. The biblical culture recorded in proverbs 22:6 aligns with the ant model that proper guidance and mentoring must be given to young ones to sustain and replicate healthy systems. God has also given the procedure for mentoring in the book of Deuteronomy 6:7

“You shall teach them diligently to your children [impressing God's precepts on their minds and penetrating their hearts with His truths] and shall speak of them when you sit in your house and when you walk on the road and when you lie down and when you get up” (Deuteronomy 6:7 Amplified version).

In our world today, the use of technology, rather than bridging the generational gap, is widening it. If only our institutions of higher learning can adopt the ant model in the design and delivery of the educational curriculum, servant leaders will be birthed; we will have more leaders and citizens with integrity whose hands and minds have been well trained to face the challenges of the future.

More than half of the total populations of the African countries are youths (Ndoga, 2012). The latest United States estimate reveals that the population of Nigeria is about 200 million and the

average age is 17.9 years (Worldometer, 2019). It is not an exaggeration that many Nigerian youths are found in every country on the continent of Africa and beyond. This suggests that providing qualitative education and godly mentorship for the Nigerian youth will have significant impact on national and global development, both in the short and long term. To achieve any form of transformation, national policy should focus seriously on human capital development. Our institutions of learning should be equipped to provide holistic education where young people will indeed be trained in character and learning.

The exegetical framework of Proverbs 6:7- 8 describes the industry of the ant as an object lesson. King Solomon, the author of this passage, was a diligent student of nature (see 1 Kings 4:33). He was intrigued by the way the ants carried on communal life in perfect order and cooperation, without anyone to oversee the process and dictate the work each member should do (Seventh Day Adventist Bible Commentary [SDABC], 1977). In the ant colony, each ant is equipped with sufficient information on the corporate goals, work to be done, and how to go about it. The workers, who carry out the majority of the tasks, though blind and sterile, are leaders in their own right. They individually understand the vision and mission of the colony and are motivated to play their individual part in achieving this vision, even at the cost of their lives. There is free flow of information throughout the colony (top down and bottom up). Thus rumours, gossips, and dissimulations do not survive. When signal for danger is communicated from ant to ant and throughout the colony, the queen does not need to call an emergency meeting. Everybody already knows what to do. When the worker ant leading a trail dies, another one takes its place, and the trail is restored within seconds.

Building Food Security

The food management plan operated by the ant shows a clear application of agribusiness management and sound economic principles. During the period of surplus, the ants process and store up excess food to be made available to the colony during the period of drought. This model was applied by Joseph in Egypt during the first global recession (Genesis 41: 33- 43). Similar model was proposed in the establishment of the commodity boards in Nigeria in 1947 and 1949 which were meant to address sustainable food supply and price stability (Abiwon, 2017). In the period of excess supply, government buys off the excess at a ceiling price to prevent glut and protect the farmers from downward fluctuation of the price of agricultural produce. These are processed and stored for export and future supply during the periods of scarcity. Thus, supply of food is maintained at the set ceiling price all year round. Unfortunately, the commodity boards have failed to achieve this food security because of lack of leadership integrity, poor planning, political interference, institutional instability, information asymmetry, and corruption none of which is found in the administrative system of the ant colony (Low, 2011; Roger. 2009).

Even though Africa as a continent is endowed with vast economic resources, unfortunately, the world's poorest households are found in Africa (Ndoga, 2012; Kazeem, 2018). While Nigeria is often referred to as the giant of Africa, especially in resource endowment, Kazeem (2018) observed that Nigeria has become the poverty capital of the world. He opined that the United Nation's Sustainable Development Goal (SDG) of eradicating extreme poverty globally may not be met because of the rate of poverty in Nigeria. Of the top 10 African countries with extreme

poverty, Nigeria ranks first (as at 2018) with about 86.9 million people living in extreme poverty (Kazeem, 2018). This figure increased to 93.7 as at 2019 and still increasing (The Guardian, 2019). The question remains why is Nigeria (and by extension, the continent of Africa) under such extreme poverty and hunger in spite of her huge endowments? Is it because the population of Nigeria is large and rising? The poverty level in Nigeria has overtaken that of India even though the population of India is about seven times that of Nigeria (Country Economy, 2018). This problem can be traced to laziness, underutilization of resources, wastages, and bad governance. Ayittey (2009) observed that the dysfunctional, kleptocratic politics in Nigeria and other African countries have consistently disorganized its societies.

The opening statement in the wisdom poem chronicled in Proverbs 6:6 is “go to the ant, you sluggard” and the closure in verses 9 to 11 strongly discourages laziness and nonchalance. The importance of diligence to poverty eradication and development, as exemplified by the ant colony system, is here creatively projected by the author of this poem. The wealth of a nation is sustained only if the politics are right and the environment is conducive for every member to work hard to manage and innovatively utilize the common resources (Kolzow, 2014). Institutional effectiveness and national development can be achieved when every member, like the worker ant, decides not to sit down in Satan’s easy chair of do-little reap-plenty, but aim to maximize his potential, not distracted but focusing on Jesus the true leader for strength to contribute to the common wealth (White, n.d).

(Hubbard, 1989) noted the sarcasm in Proverb 6:6-11 where man, with two functional eyes and a bigger brain is asked to bend down and learn lessons of diligence, integrity, responsibility and accountability from the tiny blind creature. The irony, though written several years ago, is still very true of our human systems today. The Nigerian civil service has undergone a number of reforms in the past decades with the aim of enhancing its efficiency and effectiveness. (Dlakwa, 1992) observed that the 1988 civil service reform in Nigeria was to address the defect associated with the civil service, which include undue importance accorded the generalists at the expense of the professionals, greed and profligacy among public officers, nonchalant attitude among civil servants to their duties, and corruption. Measures taken to address these defects by the reform include the adoption of a uniform structure for the civil service nationwide, harmonization of power with responsibility, streamlining of the span of control of officers to not more than eight units, expansion of the powers of internal audit units complemented by an audit alarm system, mandatory submission of progress reports by chief executives to the president on their ministries, and the rationalization of promotion criteria for public officers. These provisions are not much different from the past legislations which failed to achieve the desired results, not because they are not good, but because of lack of political will to implement them on the part of the leaders and the selfish attitude on the part of the workers.

The 1988 reform failed because it was simply grafted onto the corrupt system that caused the failure of past reforms before it. Poor work environment, nonchalant attitude, insubordination, and poor service delivery continued to be the hallmark of the civil service despite the reforms (Suleiman, 2013; Kpakol & Okpu, 2016). An obvious problem with the policy ‘summersaults’ in Nigeria is that godliness is rarely factored into the formulation. The wise King Solomon, who happened to be a seasoned administrator, under God’s inspiration, said in Proverb 14:34

“godliness makes a nation great but sin is a disgrace to any people” (NLT). Perhaps, policy makers in Nigeria and the entire citizenry need to consider the way of the ant by showing self-sacrifice, systems thinking, and unflinching commitment to sustainable management of our commonwealth. By so doing, we may achieve better resource management, greater productivity and food security.

Ensuring Security of Lives and Property

The system of the ant colony is designed in such a way that every member of the team is equipped and motivated to anticipate, avoid, or solve problems that may threaten the health of the corporate body without expectation of extra reward. The ants conceptualize security as a collective responsibility (Holldobler & Wilson, 1995). This is similar to the view of the postmodernists regarding human security (Ewetan & Urhie, 2014). They view insecurity as a threat to peace, cohesion, and their overall socio-economic development. The ant seems to understand that security is not the absence of threats, but the existence of a robust mechanism to respond proactively to the changes posed by these threats in real time.

The absence of selfishness, rivalry, and inordinate ambitions prevents the colony members from being a threat to one another and fosters their unity in battling their common enemy. Each ant, via chemical exchange (their unique communication system), is able to identify and differentiate members of its own colony from aliens (Fernando *et al.*, 2009). The unique information for identifying members of the colony is kept confidential among members of the colony for security purpose. Each colony member also displays moral responsibility to keep this security information within the colony. Threat to one member of the colony is taken as a threat to the entire colony. That is why, despite their small size, they are able to survive predation more effectively than other insects with larger body frame.

The level of insecurity in Nigeria is high and a confirmation of this is the low ranking of Nigeria in the Global Peace Index (GPI, 2019). Sadly, insecurity in the country is more internal than external. Nigerians suffer security threats more from fellow Nigerians. (Banigbe, 2018) opined that insecurity is a symptom of loss of morality in our society today. Insecurity constitutes significant threat to lives and properties and hinders socio-economic development. It slows down business activities and discourages foreign investors. The more developed economies employ proactive methods of intelligence gathering in dealing with security threats, much like what is obtained in the ant colony.

The older ants in the colony also adopt the foraging mechanism as a channel to train the younger ones not only to scout for food but to acquire more information about their environment (Gordon, 2016). Thus, the educational system of the ant colony empowers the young ants economically and teaches them how to gather and transmit security intelligence. As the young ants forage with the older ones, they build more confidence and are better able to detect security threats (intelligence gathering). As we observe the individual blind worker ant roaming for food, we may want to conclude that they are dumb and vulnerable. However, as they roam they are constantly communicating with other ants elsewhere such that the seemingly vulnerable ant quickly attracts thousands of other ants when confronted with danger (Li *et al.*, 2014). Thus,

selfless information sharing is one of the attributes that make the ants uniquely intelligent as suggested in Proverbs 6:6-7.

Conclusion and Recommendation

Sustainable development is the desired goal of every nation and the primary focus of the United Nations. Among the key components of this global ideal are human and infrastructural development, virile security system, food security and good governance. Through the Ant Model, a framework inspired by the exegetical analysis of the biblical passage of Proverbs 6:6-11, this paper assessed the organizational structure and functioning of the ant colony in achieving similar components of sustainable development of the colony. The analysis revealed that effective communication, servant leadership, focused planning, subordination of personal goals, and unity of purpose are the undergirding principles and drivers of the identified sustainable development goals in the ant colony. Therefore, these principles are recommended as pertinent in designing achievable developmental goals and ensuring sustainable institutional and national development in any human system.

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