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Poverty Alleviation in Africa by System of Systems: Technology Application, Benefits and Challenges

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POVERTY ALLEVIATION IN AFRICA BY SYSTEM OF SYSTEMS: TECHNOLOGY APPLICATION, BENEFITS AND CHALLENGES.

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In September 2016, the general assembly of the United Nations adopted the Sustainable development goals amongst which was sustainable development goal 1; no poverty. This goal is attached to a principle of "leaving none behind". Since 2016 and the recently held session in 2019, we must appreciate the tremendous steps taken towards easing the poverty rates in Africa fast forward to 2030 through embracing technological advances in agriculture, education , health care and economic systems at large.

Technology refers to any method, technique or tool used or applied to ease life and make work faster, easier and enjoyable. Having realized that Africa contributes to 70% of the world's poor population, Africans is thus the center of attention in poverty eradication lest poverty become an African thing alone in the near future. It is also noted that of Africa's poor population resides in the sub-Saharan region of which up to 70% of these poor are small hold farmers and the sub-Saharan region in general is highly dependent on agriculture.

With this insight at hand, there was high need to couple agriculture and technological techniques, which include fertilizer use, irrigation using water harvesters, modern stores like silos and many others. If people embrace such techniques and attain proper training, there is high estimation of more agricultural yields and even surplus for sale, which can stabilize food security and increase household income.

Poverty according to the United Nations means denial of choices and opportunities, a violation to human dignity depriving one of basic capacity to participate effectively in society. Demographic profile of extreme and moderate poverty defines those living on less than US$1.90 and US$3.10 per day as being poor based on household data from 89 African developing countries carried out in 2013.

Poverty, however, goes beyond measuring a certain household income, a country's economic growth and gauging income inequalities amongst income classes of people. Poverty encroaches on every aspect of human life thus solutions offered towards easing poverty levels must be holistic that, is healing to the body, mind and soul and so improving ones self-worth in living in society.

The World Food Program emphasizes that poverty is daily hunger, child malnutrition, and lack of access to clean water, shelter and health care. Little or no opportunity to go to school or learn a trade for example only 1% of the poor in South Sudan can afford to complete secondary education and may others live in constant fear of the future. Increased exploitation and abuse (physically, mentally, sexually, socially, economically and politically) also terrorize the lives of many poor people in sub-Saharan Africa.

As the backbone of most of countries in Africa, agriculture has the potential to create lucrative livelihoods and lift thousands of Africans out of extreme poverty especially with adoption of modern techniques and better quality inputs. Modernization of agriculture is critical to empowering smallholder farmers through continued provision of extension services, availing tools at subsided prices and credit will contribute to poverty reduction.

Complex technological advances in agriculture are on large-scale farms of cereals, wheat and maize. For example, precision agriculture, which involves the use of global positioning systems and other tools to collect data on crops and soil to optimize inputs like water and fertilizer, based on specific conditions. By monitoring and responding to variability in soil, moisture levels, crop growth improves while also enables farmers to be more precious with the inputs, reducing waste and saving money for reinvestment.

Secondly, genetically modified organisms (crops and animals alike) are one of the significant biotechnologies that have boosted people's lives towards more food security and higher yields from their farms. Both largescale farmers and smallholder farmers use genetically modified crops. In Northern Tanzania, many small-scale farmers embrace the modified form of sim sim seeds, sesame. Sesame is a drought resistant, pesticide coated; insect resistant and fast growing product availed to the farmers by farm Africa via the Sesame Project. With such qualities, the farmers achieve more yields, while inputting little in terms of water, pesticide and herbicides.

Farm Africa goes on to educate the farmers on how to add value to their products. There is small-scale manufacturing of sesame oil, making sesame snack bites and sesame powder, which works like coffee. Having been equipped with marketing skills too, the Tanzanians are able to earn more from the sesame. Many can now afford to school their children, have decent shelter and can access medical care.

Genetically modified crops offer great reduction for pesticides that farmers need to spray on their farms by up to 8.2% while increasing crop yield by 22%. These crops assist in soil quality preservation, reduce carbon emissions into the atmosphere and conserve water. Furthermore, they are resilient to adverse weather like drought and famine, which are characteristic of sub-Saharan countries; they also offer better nutritional value to both farmers and consumers.

Artificial breeding is the use of technologies such as artificial insemination and embryo transfer. Artificial insemination involves placing semen directly into the uterus and embryo transfer involves moving fertilized ova from a female donor to a recipient female who then rears the calf. These methods in animal husbandry, to engineer breeds of animals with better genetic qualities. Artificial insemination gives power to the cattle farmer to choose breeds of animals with desirable characteristics and breed them together; the resultant offspring give more milk for daily farming, more beef quality for ranch farmers, more resistant to disease and drought.

Cattle farmers choose to use artificial insemination for several reasons including the privilege of using one bull to fertilize several of cows, minimal spread of infections and diseases through mating and one has access to breeds that are not locally available. It is also cheaper buying semen of a bull with desirable genes other than the bull, which is overly expensive for local farmers. There is significant increase in milk and meat output on farms with improved animal breeds. This in turn increases the income

flow into farmer's pockets and improves their general livelihood.

Industrial automation involves the use of robots and automated processes to perform tasks like precision seeding, plant spacing, fertilization, spraying pesticides and herbicides and harvesting crops. This increases yields on farms and efficiency in performance of tasks under minimal supervision. Drone use to map crops, Raising non-agricultural sectors like education, health and urbanization will offer more sustainable options to further reduce poverty and spur progress towards achieving upper middle-income status in most sub-Saharan countries by 2040. The United Nations estimates the total fertility rate of sub-Saharan Africa is at 4.7 births per woman as in to 2015-2020 more than twice the level of any otherworld region. The main drivers of such high fertility rate are high desired family size, low levels of use of modern contraceptives and high levels of adolescent child bearing.

Persistent conservativeness amongst most Africa's older generations has retarded the rate at which poverty eradiation in Africa is progressing. Some attached to the traditional ways of managing their homesteads unaware of the fast moving transformations of today's world. This, too, slows the receptive rates of the younger generation towards new technologies.

Slow implementation of policies by government for example national crops research institute in Uganda had to terminate its research tests and dispose of its specimens having completed its work on genetically modified crops. This was because of absence of a law that regulates biotechnology, genetic engineering and biosafety in Uganda. With such inadequacies, development is sure to keep at a slow pace.

monitor crop growth and improve irrigation. In livestock farming, milking machines for cows and goats and shearing machines for sheep reduce cost of labor leading to maximizing profit.

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