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South Sudan, Factor 20: Farm to Market

The Impact of Poor Infrastructure on South Sudan's Agriculture

The world gets smaller every single day. Over the last few decades, technology has rapidly grown, and so has the feeling of interconnectedness between people, regardless of geological distance. To the average American, access to these technologies is taken for granted. The United States and other developed nations have been able to innovate and easily access newer technologies, but this is not the case for everyone. For instance, South Sudan has seemingly been left in the past. Access to electricity in South Sudan remains dangerously low, at just 7.7% of the total population in 2021, significantly less than neighboring countries (World Bank, 2022). Of the 54 countries in Africa, South Sudan is an outlier among outliers when it comes to infrastructure.

South Sudan is one of the world's newest countries, gaining independence only in 2011 (CIA, 2024). It is located in Central-East Africa, North of Uganda, and West of Ethiopia, with a growing population of approximately 12.1 million people (CIA, 2024). One of its notable features is its incredible ethnic diversity, with an estimated 50% of the total population comprising 20 different ethnicities, while the largest one, Jieng, makes up roughly 35-40% (CIA, 2011). This fledgling country has attempted to address food insecurity, but ethnic conflict lasting until late 2018 has left "7 of 11 million South Sudanese citizens in need of humanitarian assistance" (CIA, 2020). Despite most domestic conflicts ending, there was a resurgence in conflict in April of 2023 between two political factions, but the violence is not at the same scale as pre-2018 South Sudan (Lewis, 2023). The country has a hot climate, with temperatures ranging from ~25-35 degrees Celsius and rainfall only occurring seasonally. In 2023, average rainfall was largely below average causing large issues in crop yield (*ReliefWeb*, 2023).

Unfortunately, the lack of proper infrastructure in South Sudan has major repercussions for the civilians. As the UN reported in Sept. 2023, ⅘ of all hospitals have been shut down, leaving the "millions of people [who] required care for chronic diseases" all but abandoned in their time of need. A large reason for this closure of medical institutes is the combination of understaffed and underfunded hospitals not being able to resist militant attacks. In the same year, the "WHO has verified 56 attacks targeting health facilities, health assets, transport, health workers and patients, in violation of international humanitarian law" (Kheir & Otieno, 2023). Mothers are forced to watch as their kids succumb to malaria and chronic diarrhea, both of which are often treatable.

Clearly, the situation demands action from the international community, but before doing so, it is important to understand the family structure in this diverse country. South Sudanese families are deeply rooted in their culture. The typical family usually follows a patriarchal structure. Men typically are the primary providers for their families and inherit familial wealth. Women are typically "in charge of household duties and child-rearing" (AFS-USA, n.d.). Child raising typically falls on the mother, but members of the community also help. The official language is English, but the switch from Arabic only occurred after their recent independence, so "few South Sudanese people speak [English] fluently"

(AFS-USA, n.d.). As for the children, “young girls follow their mother’s behavior and boys learn from their father” (Evason, n.d.). This also carries into agriculture as women typically take care of the crops while men look after the animals.

Families in South Sudan tend to be larger, typically with multiple generations under one roof, with MacroTrends reporting a birth rate of 4.294 births per woman this year. It should be noted that the birth rate has declined across the last several years, but the number remains much higher than in most developed nations. Arranged marriages are the norm and the primary factors for considering marriage are the “family’s ethnicity and mode of living (e.g. cattle herders, merchants, etc.)” (Evason, n.d.). As mentioned earlier, there are several ethnicities in South Sudan, and interethnic marriage is very infrequent.

Families in South Sudan are very reliant on farming, roughly “95 percent of South Sudanese depend on subsistence farming, fishing, or herding for food and income” (USAID, 2022). While petroleum remains South Sudan’s largest economic sector (CIA 2024), this makes agriculture the most employing sector. Despite the high levels of farming, 75% of the population remains food insecure and will need humanitarian assistance in 2024. This includes 1.4 million children, and 740,000 pregnant women who are now at risk of acute malnutrition (USAID, 2022). For the kids, there is a high value placed on education, but it is usually inaccessible for any other than the wealthy. There is a shortage of teachers, buildings, and supplies (USAID, 2022).

To further understand the widespread consequences of poor infrastructure, it is vital to look at the average farm in South Sudan. The typical farm in South Sudan is a “subsistence farm”, a type of farm usually managed by one extended family where growers grow just enough food and rear just enough livestock to feed themselves. This leads to an average field size of “two hectares or less” (Dianah, 2022). To put that into reference, this is approximately the size of ~2 soccer fields. It at first seems like a large space, but the country’s history of violent conflicts and population displacement means that these farms are poorly equipped to provide enough (UNOPS, 2021), leading to high levels of malnutrition. Farmers have been fighting back against these conditions, engaging in less competition with each other. Through programs run by organizations such as the World Food Programme, farmers have been able to rally around a common enemy: hunger, “A newly formed cooperative trained farmers in using additional crops, including climate-resilient ones like cassava, to increase harvests. The growers learned new techniques in the process and were equipped with tools to build shallow ponds and wells” (WFP, 2022).

As for what is grown on these farms, South Sudan’s Ministry of Agriculture and Food Security reports that typical subsistence farm crops include beans (soybean, cowpeas, or white beans), cash crops (coffee, tea, and tobacco), wheat, rice, sorghum, and maize. While there are a few farms that grow cotton, it is uncommon. The idea of subsistence farming is reflected in the types of crops grown.

Despite the importance of these farms, there are several barriers to entry regarding access, equipment, and employment. The average trader is hemmed in to his local community where he often finds a large amount of direct competitors. To make things worse, “Individual customers are cash-strapped, and with few who can buy wholesale, market traders find it hard to find sufficient demand.

Bad and dangerous roads further prevent traders from traveling to sell their goods elsewhere" (Goltz, 2020, 10). Individual areas will tend to grow a smaller variety of crops dependent on ecological conditions, so not being able to transport goods means that farmers will be forced to lower their prices extremely to remain competitive in their community.

As for equipment, due to poor funding and the low profit (listed above), most farmers have little to no access to tools, and whatever they can do will typically use "traditional methods and hand tools" (Goltz, 2020, 31). Another reason there are few tractors, trucks, mowers, or cultivators (beyond the price tag) is the poor access to electricity. Simultaneously, irrigation methods tend to be small, and "lack of access to irrigation equipment and agricultural machinery are the main constraints on crop productivity" (ICBA, 2020). This typically demoralizes new farmers and causes most of them to abandon their farms and enter into the cycle of poverty, often with their families. The best solutions to these problems will be ones that address knowledge gaps (ergo broken irrigation systems) as opposed to implementing entirely new untested solutions (advanced robot harvesting).

The risk factor discussed in this research is farm-to-market. The low to almost non-existent access to proper infrastructure is a significant problem in South Sudan. Despite having over "20,000 kilometers of roads [...], only 400 [km] are paved" (Mahadi, 2022). This leads shop owners like 40-year-old mother Margret Achi to struggle with shops "on the verge of collapse" due to difficulties in replenishing stock caused by poor road conditions (Mahadi, 2022). As the article further goes on to say, Margret was able to see a 50% boost in her revenue after a small, paved road was built that ran through the village. Not every business owner is so lucky, and the current 400 km of roads do nothing for most of the people in this 644,000 km^2 country. Many go daily watching their businesses fail as they struggle to make ends meet. To make the issue even worse, of all the paved roads, "52.3% [...] have already deteriorated" (Paul, 2023, 33).

Insufficient electricity also exacerbates healthcare challenges. With a low physician-to-population ratio, estimated at just one doctor per 65,574 people by HealthNet TPO in May 2022, the few available doctors work with extremely outdated tools and in poor conditions. The combination of inadequate technology and decreasing government funding for health infrastructure has led to a mass exodus of health workers from public facilities, affecting the majority of the population served by these facilities (Solomon, 2021).

Modernizing the infrastructure in South Sudan is vital for the improvement of the entire country's well-being, and innovating will improve the quality of life for every South Sudanese person. "As a landlocked country with vast rural areas, South Sudan must maintain a well-functioning road network to ensure access to essential services such as healthcare, education, and markets" (Paul, 2023, 33). Simultaneously, the energy infrastructure is long overdue for an update, both in terms of source and size. In South Sudan, most if not all electricity comes "from generators that rely on imported diesel. This energy dependence requires hard currency, which is a drain on the government's limited cash reserves" (ReliefWeb, 2023). A shift toward modern electrical infrastructure allows the government to spend its dollars on long-term, sustainable forms of energy rather than short-term, inaccessible ones. The nation has a high potential for renewables, given that it is in a sunny region and has the Nile running through it.

It is time for the situation in South Sudan to be resolved, and infrastructure must be improved to promote the success of South Sudan's largest industry. To briefly address the isolationist perspective, concerned global citizens should recognize that the following solutions require minimal new spending, focusing instead on better organization and oversight of existing resources. South Sudan is perhaps one of the best places for countries to help as these solutions would not be intense on resources. Additionally, aiding South Sudan also has the benefit of reasserting the waning democratic influence in South Sudan (and Africa as a whole) which is in the interest of all nations that fear authoritarianism and its consequences. This paper is going to offer four solutions, two of which need to be carried out by governing bodies, and two of which can be done by the civilians.

The first government-oriented solution is feeder roads. Feeder roads are a set of branching roads that all form a larger main road. As mentioned before, a primary reason farmers can not make enough money is that they are forced to compete in an ecosystem where what they produce is abundant, thus causing them to engage in fierce competition where they sell goods at far lower prices than they are worth. Creating feeder roads would allow the producers to take their product to more scarce areas, and get more money, thus allowing them to reinvest in their farms with better equipment and increased vigor. Feeder roads would also increase the demand for the products. Local business owners would see a new influx of customers, all of whom have different demands. This is already evident through an experiment done by the EU in Ayien Amoul, and now "The market in Ayien Amoul is also receiving more visitors, who are looking to buy groundnuts, fish and other local agricultural products" (UNOPS, 2021). As businesses try to keep up with demand, they will buy more from a wider variety of farmers, creating a positive cycle of growth in the farm-to-market community. While the European Union, more specifically UNOPS, was responsible for the first set of feeder roads, the job is not yet done. South Sudan's government should allocate more of its farm aid to building feeder roads. Individuals can petition local and municipal governments, use the power of peaceful protest, and other avenues of political participation to speed up the process. Admittedly, this is a long term solution that will take time to happen, due to the corruption in South Sudan's government (CIA, 2024). The corruption primarily comes from government elites taking money from public coffers and then diverting the funds elsewhere into personal accounts. As a former president in 2012 described, "South Sudan's ruling elites had diverted more than $4 billion USD" (OHCHR, 2021), and as the article later describes, one unlawful payment made from the government to a businessman represented 21.6% of South Sudan's total capital expenditure of the 2018/2019 fiscal year. The next solution would be an effective way to curb this as it places much more scrutiny on where public funds are going. As such, the government and individuals should use this solution as a long term solution, while using some combination of the second and fourth solutions to help affected families in the short term.

Effective budgeting is the second and final solution the government can carry out. Already, South Sudan receives an annual 1.12 billion USD of aid from the UN Mission in South Sudan (UNMISS) (ReliefWeb, 2023). They have received this money since 2011 to decrease reliance on oil, but at the same time, ~320 million USD has been spent just on diesel for the generators that they have been using. It is time that South Sudan's government steps up and puts the money into long-term energy sources. Given the lack of proper technology access in South Sudan, a strong increase in access would have dramatic results making this solution particularly effective in South Sudan. Again, this is another solution that will need time to be carried out. International bodies should focus on instituting conditional aid with stringent checks (i.e. sending surprise investigators, bringing in third parties to check, etc.) that ensure that South

Sudan moves in the right direction. The international community should keep the aid monetary as well as some level of personnel (which comes more into play during the final solution). The reason for this is that it is the easiest to track, and also the easiest to revoke should the rules be broken. This would also be an effective way to reduce corruption as all leaders, even corrupt ones, need some minimum level of approval from the citizenry. Should the corruption persist and the money be revoked, they will now have an angry populace tired of the government's selfishness. Thus, they now have pressure to lead better; failures are more visible and noticeable.

As for what individuals can do, communities should come together to farm, rather than having individual families carry the burden. This reason is at the root of the reason why "More than 90 percent of South Sudan's land is arable but only four percent of the land is cultivated" (*South Sudan - Land Governance Country Profile*, 2018). Farm size is already quite small, so the combination of family farms into larger plots of land in tandem with the sharing of traditional farming techniques would allow the people of South Sudan to produce at a far more effective rate, and would also help with having the farms compete against each other. As discussed earlier, this is a major reason why many farmers enter the cycle of poverty, and ending that cycle is vital to sustainable agricultural practices. As for the argument that this would require a divergence from culture, it must be realized that culture would not be forgotten, only shared. By sharing techniques and farms, communities can further the bond that holds them together, and allow for unity rather than animosity between farmers. This could be done multiple ways (financial incentives, education, media, etc.). Doing so would create a positive, supporting environment that encourages farmers to work and share in the profits together, rather than suffer alone. This would also serve to make the citizens more unified and proactively prevent the government from isolating and targeting farmers that push especially hard for change.

The second people oriented solution is to seek out programs that teach farmers new skills. Due to stagnation in technology and farming based on family tradition, farming in South Sudan has not developed much over the years. South Sudan's people should seek out organizations like the FAO which, from the UN's website in 2022, has taught conservation agriculture in places like Kenya, drastically increasing innovation and cooperation. The FAO is largely successful because they have an incredible amount of scientists working with them along with usable data from several other countries that faced or are currently facing similar issues.It also helped farmers grow more resilient plants, which could prove crucial in the dryer seasons. One specific aspect that farmers can learn about is irrigation, "the majority lack knowledge about salinity-related issues and irrigation management. They put low yields down to insects and diseases" (ICBA, 2020). This directly leads to the current irrigation system being poor and perhaps one of the best areas for improvement given the resources available (Nile river, tributaries, and groundwater sources). Aiding farmers in better understanding how and why they have low crop yields would provide future generations with knowledge that will make them more successful farmers, and go a long way in decreasing food insecurity. For their part, the people should do their best to approach these techniques with an open mind, and in following with the ideals of the previous solution, be excited to share the techniques with other farmers. Another potential organization for individuals and groups alike to look for is AgriCorp, an organization which focuses on connecting farmers to programs to enhance their techniques and knowledge. AgriCorp is also ideal as they have a particular emphasis on understanding the farmer rather than trying to apply a blanket solution. Ideally, the government would aid in helping the people through this process, so the people should try and petition their government to do so. However, being a realist, it will take time to counter the corruption and bureaucracy abundant in the government, so the people should rely on each other first, and then the government.

The challenges faced by South Sudan, particularly in its infrastructure and agricultural sectors, are substantial and multifaceted. A majority of the people face food insecurity exacerbated by poor infrastructure. However, by working cooperatively with the government and the people, the issue with the farm-to-market system can be alleviated. Feeder roads branching from main routes would enhance market access for farmers, stimulate local businesses, and boost agricultural productivity. Governments should prioritize investing in long-term, sustainable energy sources to reduce reliance on diesel generators, thus improving access to technology and increasing agricultural efficiency. Encouraging communities to collaborate on farming initiatives, and sharing resources and traditional techniques, would increase farm size, promote unity, and alleviate the burden on individual families, ultimately leading to more sustainable agricultural practices and economic development. Implementing programs to teach farmers new skills, such as conservation agriculture and irrigation management, would enhance innovation, resilience, and productivity in the agricultural sector. The time to act is now. By combining the multiple solutions, the international community can ensure both short and long term success. As such, farmers in South Sudan will be able to experience more economic success. Importantly, they will not have to worry if they can feed their families that year.

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