ENERGY CATALYST

INSIGHT: Decision-making guide for international supply chains

Authors: **Javier Baranda**, Business Analyst, Energy Catalyst Accelerator Programme
javier.baranda@energy4impact.org, and **Martin Jarvis,** CEO, Integrated Business Planning

Energy Catalyst accelerates the innovation needed to end energy poverty. Through financial and advisory support, and by building strategic partnerships and uncovering new insights, Energy Catalyst supports the development of technologies and business models that can improve lives in Africa and Asia.

This insight piece explores different options for energy entrepreneurs to establish their supply chain when trying to enter markets in sub-Saharan Africa, providing a framework that can be used to select the most appropriate solution.

Context of international energy supply chains in sub-Saharan Africa (SSA)

Africa's installed capacity of renewable energy, which stood at 12.6 GW in 2019, is set for record growth in the coming years, due to a combination of all-time low costs of renewable energy technologies, such as solar PV, and the increasing electricity demand across the continent. While most sub-Saharan countries are implementing renewable energy projects, both at grid and decentralised scale, most of the manufacturing value chain for such technologies is located outside of sub-Saharan Africa. In the case of solar PV modules, China, India, and other countries in Asia, such as Malaysia, Vietnam or Thailand, have established themselves as leading global manufacturing centres, while other specific components for energy systems, such as batteries, are often manufactured in Europe or the United States.

Apart from South Africa, which has developed an industry around solar PV module production and assembly, generally leading internal trade within the region, most countries in sub-Saharan Africa have limited supply chains within the renewable energy sector. This constraint has further hampered the

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development of local renewable energy value chains, already challenged by the lack of technical and engineering skills, as well as the low levels of financing available locally.

While large energy companies in sub-Saharan Africa generally source standardised components from remote manufacturing centres (Asia, EU), benefitting from established supply chains and large volumes of products, energy entrepreneurs face a more complex decision-making process. Their limited working capital and lack of on-the-ground presence in their African target markets can hamper their ability to establish long supply chains, which tend to favour large volumes of products.

The current Covid-19 crisis, involving movement restrictions and temporary disruptions in international supply chains, has exacerbated the challenges that energy companies face in sub-Saharan Africa, as well as highlighting their dependency on remote manufacturing centres. In a 2020 survey of off-grid sector companies by SE4All, imports and inventory constraints emerged as top concerns for distributed energy companies, which aligns with the impact experienced in other sectors.

The decision of where to establish the manufacturing part of the supply chain is therefore an important step when considering how to scale-up operations in African markets beyond promising prototypes and pilot projects. The choice depends on several factors, including in-house manufacturing capacity, the complexity of the solution and the volume of products involved.

Manufacturing options available for energy providers

Three main options can be considered for the manufacture of components: in-house manufacturing, 3rd party manufacturing in remote already-established manufacturing centres, or 3rd party manufacturing in local markets close to the final point of use.

	In-house manufacturing	3rd party manufacturing in remote centres	3rd party manufacturing in local markets
Advantages	Control of quality and Intellectual Property Rights (IPR); Prioritisation in production line planning	Least cost option; Specialised companies	Shorter supply chain; Reduced complexity
Disadvantages	Specific manufacturing skills; Upfront costs	Long lead times; Complex supply chain	Local capabilities for specialised products; Availability of materials

Figure 1. *Advantages and disadvantages of manufacturing options for industrial assembly. The colour code indicates whether the benefits are increased (green), reduced (red) or independent (blue) with larger volumes of products.*

A key aspect to be considered by energy entrepreneurs willing to expand their operations in African markets is that **the longer the supply chain, the higher the working capital they will have tied up for substantial time periods**. For instance, while shipping from manufacturing centres such as China would typically be the least cost option, lead times to transport components to the main SSA ports can range between 30 and 50 days on average, with trade disruptions sometimes resulting in even longer timeframes. In addition, transportation from within African countries to the final point of use can also considerably increase the lead times due to less established supply chains and inadequate transport infrastructure. Manufacturing the components locally in Africa will likely reduce the lead times and complexity of the supply chain, but depending on the characteristics of the components, companies might face a shortage of manufacturing capability or raw material supply to meet their needs.

Decision-making framework for selecting international supply chains

While there is not a straightforward solution, there are some general aspects that companies can consider when making their supply chain decisions. These solutions can also change in step with the company's changing needs and scale of operations. The figure below illustrates a decision framework that can be useful for companies, not exclusively in the energy sector, willing to introduce their products into African markets:

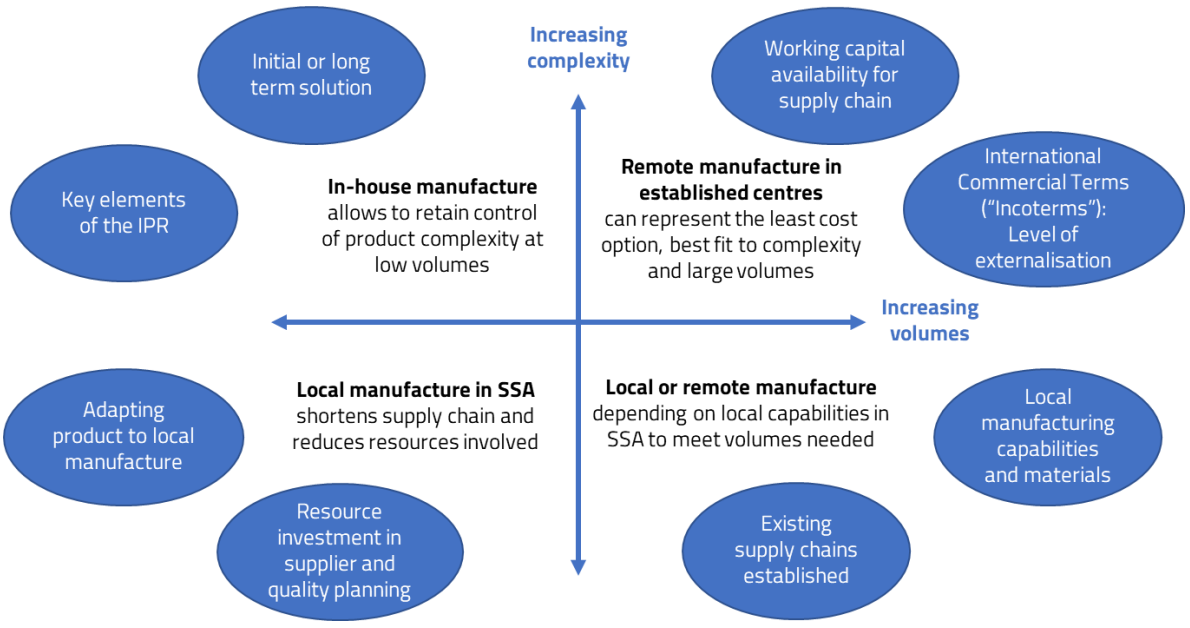

Figure 2. *Proposed decision framework for the selection of manufacturing options based on the characteristics of the products and key associated considerations.*

In addition to this decision framework, different strategies can be used by companies:

- Start with in-house manufacturing while the production volumes are low, which allows for maximum control of product manufacturing and intellectual property rights, then progressively shift to 3rd party manufacturers when scale of operations and costs increase.
- Concentrate complexity and added-value of the product in one or a few components, manufactured in-house, and standardise the rest of components for 3rd party manufacturing in order to minimise in-house resources and total manufacturing costs.
- Adapt the complexity of the product to match the existing manufacture capabilities in local SSA markets, including considering new materials widely available locally.
- Capitalise on existing supply chains, established both at local and international level to reduce the complexity of your supply chain. These can be for similar products or components, but also for other widely available goods and commodities not related to the energy space.

Regardless of the proportion of the value chain that is established locally in Africa, establishing partnerships with local actors that have experience of regional and national trade regulations, and are used to dealing with common trade constraints, can be a key success factor in the first expansion stage of a company. If importing from remote international manufacturing centres, seek support from local customs and trade companies that can deal more agilely with the sometimes burdensome tariff and custom requirements. Additionally, a good understanding of International Commercial Terms, commonly referred as Incoterms, is crucial to identify the most adequate level of externalisation of the supply chain responsibility towards international suppliers.

Entrepreneurs willing to import their innovative technologies into markets such as Africa should also consider the administrative nature of custom requirements, where highlighting the singularity or unique nature of the goods imported will likely result into more costly and burdensome procedures. Contrarily, presenting those goods in the most standardised way possible can facilitate custom controls. For newly developed technologies, additional costs around product testing and certification might be required, but these should be considered as an upfront investment required to test the viability of the product in the intended market. Upon scale-up, other factors such as cost or sustainability optimisation of the supply chain can be introduced. Finally, entrepreneurs should consider the potential tax incentives and subsidies existing in certain countries, for instance for clean energy technologies, which might be claimed or linked to the import process.

Although there is no one-size-fits-all solution, entrepreneurs have a range of options when settling upon the manufacturing part of their supply chain, depending on factors such as the complexity of their product, the volumes required and the working capital available. However, in many cases the options available are already dictated from the design phase of the product. Promoting early-stage conversations on the manufacture of the products and on their adaptability for the resources available in the target markets can significantly facilitate product deployment in the future, saving companies valuable time and resources when introducing their products in African markets.

Further Reading

SE4All survey on Covid-19 impact on the off-grid energy sector

International trade, tariff and non-tariff measures. World Integrated Trade Solution (WITS)

Average customs clearance time. World Bank database (2020)

Trade logistics in the global economy. World Bank (2018)

Trade integrations and global value chains in sub-Saharan Africa. International Monetary Fund (2016)

What are InCoTerms? Velotrade guides (2020)

Sub-Saharan Africa supply chain opportunities. IHS Markit (2021)