# Re-Building Sudan
## AFTER THE WAR

## INDUSTRY, INNOVATION AND INFRASTRUCTURE

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# CHAPTER 24


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CONCEPTUAL

# Roadmap to Rebuilding the Sudanese Industrial Sector after the War

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## ABSTRACT

**PURPOSE:** This chapter highlights some of the huge challenges to rebuilding the industrial sector of Sudan after this damaging war comes to an end. It is also a contribution to the formulation of a national industrial strategy for Sudan as a step towards the industrialisation of the country as a part of a comprehensive National Development Plan (NDP) while achieving the UN's 2030 Sustainable Development Goals (SDGs).

**DESIGN/METHODOLOGY/APPROACH:** A qualitative approach based on theoretical analysis and critical assessment was used. The raw data were collected from official sources in Sudan as well as reputable international organisations

**FINDINGS:** Challenges to the process of rebuilding the Sudanese industrial sector were critically assessed and a route map for the rebuilding process was drawn. A contribution was prescribed towards formulating a national industrial strategy for Sudan as a step towards the industrialisation of the country as a part of a comprehensive NDP while achieving the UN's 2030 SDGs.

**ORIGINALITY/VALUE:** Rebuilding Sudan following the devastating war that destroyed 90% of its industrial establishments is a huge task that requires the efforts of all its experts. This chapter is a contribution towards rebuilding the industrial sector of Sudan. There is generally precious little discussion of the issues facing Sudanese industry in the literature. This study helps to bridge this gap and suggests a practical way forward to help rebuilding the Sudanese industrial sector as a major component to improving the performance of the Sudanese economy and, consequently, alleviating poverty.

**RESEARCH LIMITATIONS/IMPLICATIONS:** War has greatly affected the normal official business of the state in Sudan; this made collecting data from Sudan a difficult task. However, the author used his own private sources, as well as highly reputable international sources, to gather the essential data required for the analysis.

**PRACTICAL IMPLICATIONS:** The findings of the study are directly relevant to the Sudanese case and can help the country to rebuild its industrial sector and put the economy back on track. However, the lessons can be applied to other developing countries that have similar economic or industrial issues, whether created by war or other factors, such as corruption and bad governance.


**KEYWORDS:** *Rebuilding; Sudan; Industry; Strategy; Policy; Plan; UN 2030 SDGs; Sustainable; Development; Economy*


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## INTRODUCTION

Sudan has been plagued by political instability since its independence in January 1956. However, the last two years have witnessed an especially savage war that impacted all facets of life. The war began on 15 April 2023 and is still raging. In addition to changing the fabric of the society, the industrial sector has taken a huge blow. The infrastructure was destroyed while factories were systematically dismantled. Power supply to homes and businesses were cut, water treatment works hit, the transport system became dysfunctional, telecommunication networks dismantled and factories were systematically completely or partially destroyed. This unfortunate situation dictates different priorities on the Sudanese people after the war stops and safety and security prevail. An immediate industrial survey is required to enable a scientific assessment of the sector, rebuilding the damaged infrastructure and manufacturing sector, and taking a deeper look into relevant legislations to help encourage investment in the sector are essential. Likewise, articulating an industrial strategy to set targets and guide the country's industrialisation process in the immediate, short, medium and long terms is needed.

Indeed, articulating a national development strategy (NDS) for the country is required in all fields, not just the industrial sector. This is a collective responsibility for all the experts, who should come together and push towards having a comprehensive NDS for the country. However, the task of planning for rebuilding Sudan's industrial sector, and indeed the whole country, should start now, not after the war stops. As such, this chapter highlights some of the huge challenges to rebuilding Sudan's industrial sector after this damaging war comes to an end, and defines the footprints for a successful industrial strategy to help the rebuilding process.

## METHODOLOGY

The destruction to the country was big, deep, devastating and unimaginable, and rebuilding Sudan after the war is a huge task that will require the efforts of all its loyal citizens. After the war stops and safety and security are restored, the rebuilding process has to start by re-establishing the state itself and laying down the basis for political stability and good governance, which the proud, generous and courageous people of Sudan deserve. In parallel with that, the country must rebuild the services and infrastructure and then quickly divert attention to rebuilding the economy.

Dafa'Alla *et al.* (2017) and Dafa'Alla and Hussein (2018) explained that, in order to improve the trade balance, a heavy injection of industrialisation to the Sudanese economy is essential. To demonstrate this, Figure 1, which was reproduced from the meta data from World Bank (2024a, b), depicts that the Sudanese Gross Domestic Product (GDP), which is an indicator of the overall health of the economy, rose between 2000 and 2014 following a reasonable contribution of the industrial sector of over 20% during this period. However, it started to dive irrecoverably in 2015, the same year when manufacturing's contribution, which is a major sub-sector of the industrial


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sector, to the GDP collapsed, as shown in the figure. Therefore, the trends in the two plots in Figure 1 are the same. This demonstrates beyond doubt the organic bond between a healthy industrial sector and economic development in Sudan. Note that the apparent increase in GDP in 2022 shown in the figure is due to data extrapolation as real official data in this year was not available due to political instability that precipitated the war in April 2023.

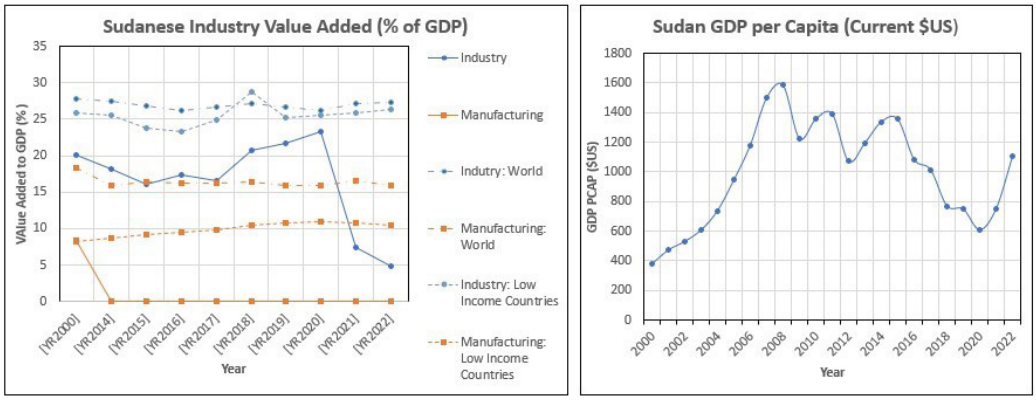


**Figure 1: Organic Relationship between Industrial Contribution and Economic Health**
*Source*: World Bank, 2024a, b

Some may argue that the Sudanese economy is largely agriculturally-based, so why should we focus on industry and give it a high priority? However, one should also note that the maximum economic benefit from agriculture can only be realised when extensive investment in agro-based and associated industries is achieved; this is because industrialisation increases the value of agricultural products many fold. To bring this closer to comprehension, note that the average USA crop moving from the field through cotton gins, warehouses, oilseed mills, and textile mills to the consumer, accounts for more than US$35 billion in products and services (Cotton Counts, 2020a) in addition to creating more than 440,000 jobs (Cotton Counts, 2020b). If Sudan can do the same, it can pay all its foreign debt, which is about US$56.05 billion as of 30 June 2018 as estimated by the CIA World Factbook (Index Mundi, 2020), in less than two years! To put this in context, note that the real value of cotton, for example, increases 40-fold after being processed and manufactured into goods for human consumption, as demonstrated in Figure 2 (USDA, 2018). This is not only applicable to the agriculture sector alone, but indeed other natural resources, such as mining and oil.


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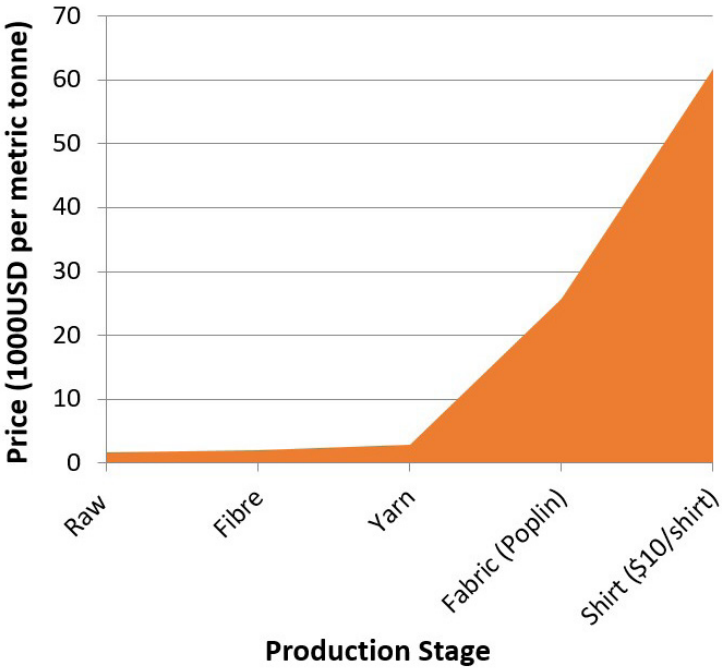


**Figure 2: Industrial Value Adding of Cotton**
*Source*: Constructed from USDA (2018) data

Therefore, in order to rebuild the economy, Sudan has to adopt an integrated sustainable development plan, in which industry represents the pivotal point. That is because industry is the lever to balance the books and accumulate wealth. Industry also creates jobs: it represents over 40% of the Sudanese job market. Additionally, it also acts as an incentive for developing infrastructure and indeed human, social and community developments.

*Therefore, industry is the prime mover for economic and social development.*

## THE PROBLEM

The initial estimate of the Ministry of Industry is that 90% of industrial establishments had been partially or completely destroyed during this war. If we look at the distribution of these establishments before the war as extracted from Dissman (2004) and shown in Figure 3, we discover that 87% (20,934 out of 24,114 excluding the states that now belong to South Sudan) were established in the directly affected war zones: this supports the Ministry of Industry figures. Imagine that even the machinery in some factories had been dismantled and stolen in a similar manner to destroying Mummies in the National Museum in Khartoum, bombing Polio vaccination stores in Al-Fashir and mutilation of corpses of victims in Al-Gunaina. This may sound senseless, but it also shows


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that these actions are systematic policy of the militia in this war. What really concerns us here is that the relationship between industry and economy is an organic one, as argued above. When industry suffers this kind of destruction, the whole economy suffers as well and, surely, the phase of rebuilding the country becomes more difficult and more expensive.

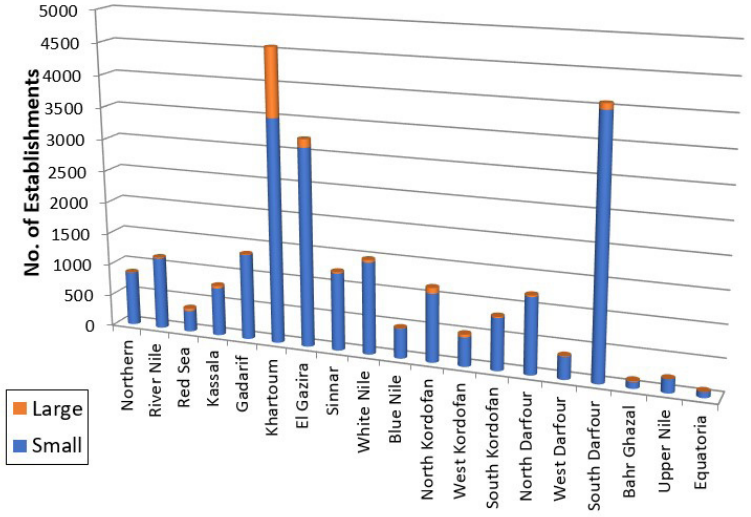


**Figure 3: Geographical Distribution of Industrial Establishments in Sudan**
*Source*: Dissman, 2004

## THE WAY FORWARD

The industrial sector can generally be divided into manufacturing/transformational industry, such as sugar, textile and food industries, and non-manufacturing such as construction and telecommunications. The consensus among economists is that the performance of the Sudanese economy is a failure and the contribution of the industrial sector as a whole to the economy is pretty small. This is true even before the war. Indeed, according to the most recent figures from the World Bank (2024b) depicted in Figure 1, the Sudanese industrial sector's contribution to the GDP has dropped from 20% in 2000 to 16% in 2015, recovering gradually to 23% in 2020 before collapsing sharply to 5% by 2022. More dramatically, the contribution of the manufacturing sector alone for the same period, affected by the secession of the South in 2011 and the subsequent loss of three quarters of the productive oil fields, dropped from 8% in 2000 to almost nil since 2014, as shown in the figure. This shows a complete collapse of the industrial sector, even before the war started. However, the potential of reaching and even surpassing the levels of other low-income countries, and even the world industrial contribution to the economy shown in Figure 1, is there. This is great thanks to Sudan's abundant reserves of agricultural land and other natural resources, such as


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forestry, animal wealth, minerals and oil. Therefore, there is a hope that things will recover quickly when the war stops, and the economy will grow back to its pre-war status and beyond.

The industrial process has enablers and inhibitors and the main ones are summarised in Table 1, which is reproduced from Dafa'Alla *et al.* (2017). The availability of each of the factors stated in the table determines whether it is an enabler or inhibitor. For example, easy access to finance is an enabler, while lack of it makes it an inhibitor. Likewise, existence of corruption is an inhibitor, while fighting corruption is an enabler, etc. Therefore, it is important to understand these enablers and inhibitors well in order to tackle the problem successfully. The starting point should be enhancing the enablers and dealing with the inhibitors, the objective being to revert inhibitors into enablers. It should be noted here that the industrial process engages most, if not all, governmental departments. Involvement of departments, such as industry, planning, treasury, education, transport, information and communication, is vital; therefore, effective co-ordination between them is a pivotal task. This requires good governance, political stability and the elimination of corruption; Sudan is among the 20 most corrupt countries in the world (Transparency International, 2023) and has been so for decades. This is a huge problem and must be overcome.

**Table 1: Enablers and Inhibitors to the Industrialisation Process**

| | |
|---|---|
| 1. Industrial Strategy | Guides industrialisation process & direct investments towards economic effectiveness –Part of National Development Strategy. |
| 2. Industrial Policy | Enables strategy, creates the right environment for investment. |
| 3. Industrial Planning | Vehicle for implementation, shows commitment of funding, resourcing & timeline. |
| 4. Coordination | Accountability for IS is the responsibility of the whole government , hence needs departmental coordination. |
| 5. Access to Finance | Enabler: enough foreign reserves to meet demand & clear financial policies in place to encourage investment. |
| 6. Infrastructure | Includes both physical (roads, oil, etc) and informational (ICT). |
| 7. Skill & Innovation | Education system should meet the demand for required skills + Industrial training for targeted specific skills. |
| 8. Information & Communication | Important to engage stakeholders as well as general public to understand the industrial process and enable implementation phase. Investors need information. |
| 9. Good Governance & political Stability | Draw effective plans, supportive policies and regulations, monitor and guide fair and strategic public and foreign investment, oversee proper implementation. |
| 10. Corruption | Corruption deters investors and inhibits industrial process - eliminate |

Industrial Process

Lethal Combination

*Source*: Dafa'Alla *et al.*, 2017


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The war, however, has forced Sudanese experts to also talk about the "immediate" phase of rebuilding the industrial sector that the country needs to deal with during the first two years after the fighting ceases. Figure 4 schematically shows the impact of the war on implementing the industrial process. In order to establish the industrial process based on strong scientific foundation, this phase must start with an industrial survey. This is because formulating an industrial strategy for the country requires information and statistics that can only be gathered via an industrial survey. This is inevitable after the massive destruction inflicted on Sudan's industrial sector during the war. In parallel with this survey, Sudan should start to maintain and rebuild the infrastructure and existing industrial establishments. The rebuilding process should include considerations for quality, environment, health and safety. These are essential to ensure sustainability and employees' wellbeing and abide by international standards for modern industry. Note that it is much cheaper to consider these aspects now than implementing them later on as a retrofit.

This should also be accompanied by a deep look into the industry and investment laws and legislations and updating them to consider the new realities dictated by the war. To bring this closer to our comprehension, the existing industrial law, for example, gives tax and customs incentives for building new factories; however, this does not include rebuilding existing ones. Considering the volume of destruction that has been inflicted upon these existing factories, the law must be updated to help the rebuilding process. These tasks should be attended to at the first, or immediate, phase of the rebuilding process of Sudan's industrial sector, as depicted in Figure 4. Note that the timescales associated with the different rebuilding phases of the process in the figure are only indicative and not set in stone. Therefore, they can be adjusted slightly according to the realities on the ground and the speed and efficiency of completing each phase. Tasks within each phase can also overlap if required, particularly between the immediate and short-term phases.

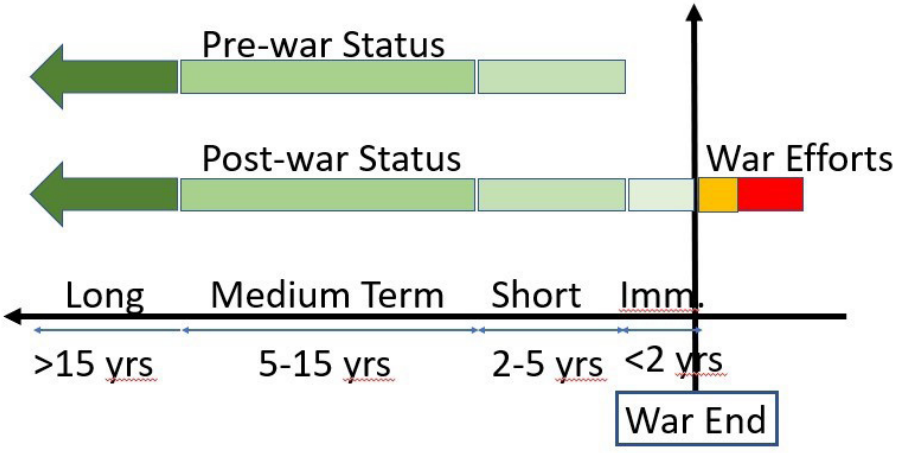


**Figure 4: Typical Industrial Strategy Implementation Phases**
*Source*: Constructed by author


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The second, or short term, rebuilding phase (see Figure 4) is dedicated to writing a comprehensive industrial strategy, supported by and stemmed from an industrial policy and industrial plan for implementing the strategy. These three items are interlinked and feed directly into a more inclusive NDS and NDP, as schematically shown in Figure 5. The IS will set the vision, determine objectives and guide the industrialisation process in the short, medium and long term phases of the rebuilding process. This should be supported by drafting an industrial policy to create the required investment-attractive environment. A comprehensive industrial plan should be drawn as a tool to meet the objectives of the industrial strategy in a timely, controlled and systematic manner, as shown schematically in Figure 5.

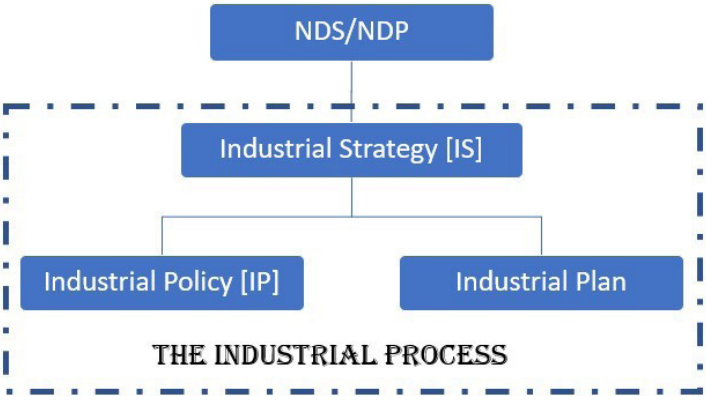


**Figure 5: Schematic of the Industrial Process**
*Source*: Constructed by author

In turn, the industrial plan should consider the geographical, federal and social structure of the country. At the same time, it should be formulated with the natural distribution of the raw materials and other industrial inputs and logistics in mind, as well as the required infrastructure. This could be facilitated by dividing the country into industrial zones based on the available resources and need for their development for the benefit of their local communities as well as the whole country. For example, imagine that the Darfur region becomes the centre and "home" region for dairy products and meat processing, the Northern region for vegetables and food industries, the Nuba Mountain for mining industries, the Blue Nile region for flour mills, Al-Gazira for agro-industries, Kordofan for Gum Arabic processing and the Red Sea region for developing gas, oil and fishery industries, etc. This will enhance not only the economic benefit of the industrial plan, but also the social and political objectives of the overarching NDS.

The idea of decentralising services was also flagged by Elhiraika (2019), who promoted the uniformity of development via diversification of the economy by identifying and developing regional "economic development growth poles". It should also be remembered that the industrial plan should consider the environmental impact and sustainable development goals in its objectives.


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Note that, in addition to achieving the set economic targets, sustainable development has to reduce harm to the environment and produce regenerative impacts on natural and social systems (WCED, 1987). In other words, optimising resources to ensure continuity, preserve the environment, and safeguard rights of future generations to natural resources. Therefore, the industrial plan should be formulated with the rights of coming generations to natural resources in mind. This will make it beneficial, durable and consistent with international standards required to meet the UN's 2030 Sustainable Development Goals (SDGs) published in 2015. This will help attract international investors, who prefer to come to countries that uphold international standards. Therefore, adhering to these principles will lay the foundation for building an attractive investment climate, which is needed to re-energise the whole economy.

The industrial strategy forms the nucleus for an NDS for building the future of Sudan. The NDS will define the vision and direct the economy towards sustainable development. It will also give the country a state of stability regarding planning and legislations in the short, medium and long terms. We should also remember here that the industrial strategy should be formulated to suit the social and cultural realities and economic development needs of the country in question. Therefore, it cannot be a "copy and paste" version of another country's strategy even though the political and economic realities of the two countries are broadly similar. Figure 6 shows a good example of the main generic ingredients of a successful strategy as summarised by the Institution of Engineering and Technology (IET) (2012).

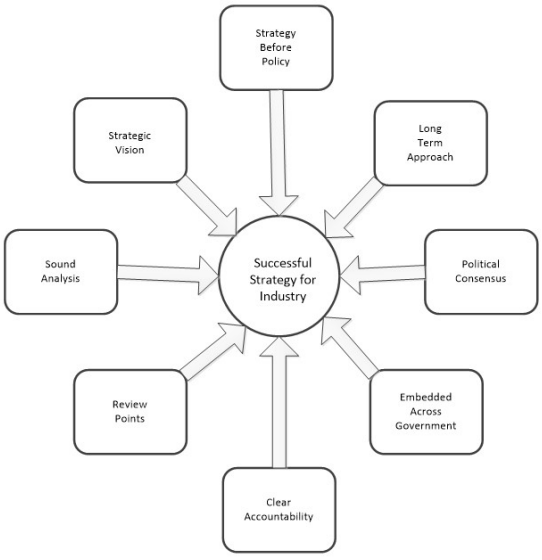


**Figure 6: Main Ingredients of a successful Industrial Strategy**
*Source*: IET, 2012


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A final point in this respect is that the history of industrial strategies in Sudan is not good. Figure 7 lists the main strategies in chronological order since the colonial era. All were cut short before their full terms expired and none had achieved their set objectives! Lack of strategic vision and direction, wrong policies, mismanagement, maladministration, favouritism and corruption were the general themes that led to their failure, particularly over the last 30 years. An important lesson to be learnt from this history is that the industrial strategy cannot be the responsibility of a specific government department. Indeed, formulating an industrial strategy is a task for experts, not politicians, and it must cover a long period of, say, 20-50 years. This will take it out of the political conflict and competition and will assure the country of a scientific, stable development plan that is agreed upon between all stakeholders. The role of governments here is to implement and monitor the implementation of the strategy, not change or modify it without consultation with the experts and specialists. However, achieving policy co-ordination and commitment requires leadership and accountability at the highest levels of government. Naturally, the industrial strategy predicts the future, setting the long-term direction; in turn, this is subject to local as well as international developments. This is difficult, and only clear accountability can help mitigate this risk by ensuring such predictions are continuously reviewed and validated (IET, 2012). This leads us to propose creating and legislating for a quasi-official governmental agency for the NDS that is composed mainly of experts. Although publicly accountable, such an agency should be operationally independent because, ultimately, public accountability lies fairly and squarely on the shoulders of the government.

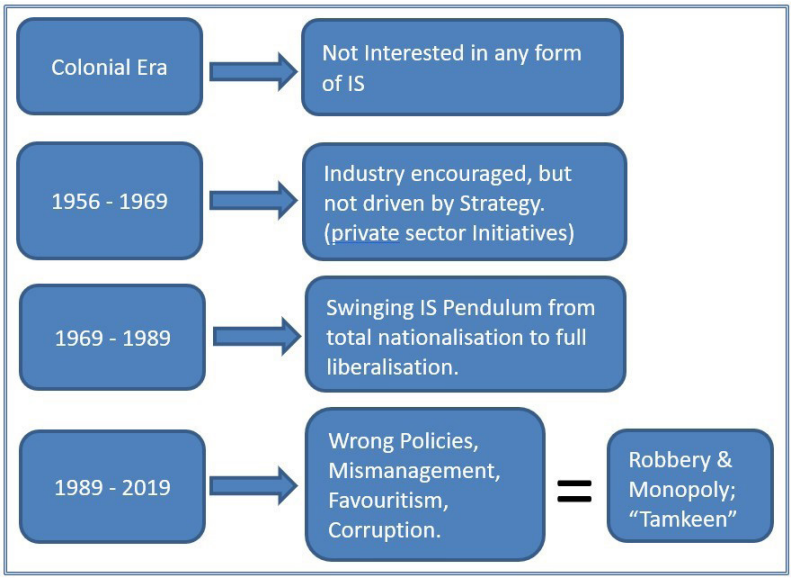


**Figure 7: History of Industrial Strategy in Sudan**
*Source*: Constructed by author


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Note that the general objectives of a country's industrial and economic strategies are capacity building, achieving sustainable development, and increasing investment with the aim of raising the standard of living of the citizens. Therefore, updated laws and legislations must be ready at the strategy implementation phase. It is important for investors to find the policies in place and working in practice before committing into investing in a risky country.

## THE FUNDING

Remember that industrial development is not cheap; it needs both capital and human resources. The government cannot do it alone; it has to be helped by genuine partnerships with private and foreign investors. However, the priority should be for the public sector, using income from exporting gold, gum Arabic, animal products, etc., and giving priority to infrastructure and services. Intelligent partnership is needed between the Sudanese diaspora (the great asset of our country), the government and, if required, host countries for this diaspora. An example of such a partnership is given in Figure 8, which is reproduced from Dafa'Alla and Hussein (2018), who promoted the 3-way public private partnership (PPP) between the government, Sudanese Diaspora and their host countries. The figure illustrates how such a partnership can work in practice to help the country to achieve sustainable economic development. It is a PPP model for formulating industrial and economic strategies, building capacity, driving sustainable development and making investment (Dafa'Alla and Hussein, 2018). Forming and legislating for such a three-way PPP can encourage and incentivise diaspora as well as foreign countries and sources of investment to come to Sudan and get engaged with the country's development plans – a win-win situation. The third route for funding comes from the private sector, giving priority to the national over foreign private sector. A partnership between the two may also be considered where and as appropriate.

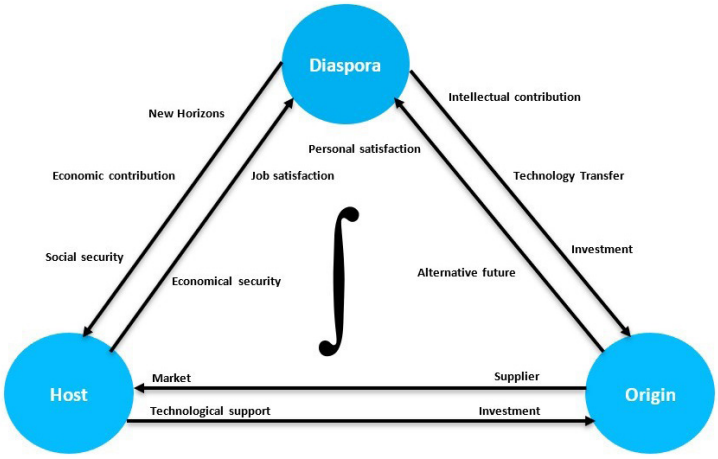


**Figure 8: Three-Way PPP Model for the Diaspora as International Agents for Development**
*Source*: Dafa'Alla and Hussein, 2018


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However, in addition to satisfying the above requirements, attracting private and foreign investments requires the right environment for investment and sustainable development. This comes through political and economic reforms as well as cultural change. Creating an investment-attractive environment simply means political stability and fighting corruption, clear industrial strategy, clarifying a set of priorities, clear policies to ease access to finance at reasonable cost to investors, as well as incentives through taxation policy as part of a coherent industrial policy that defines and protects the rights and responsibilities of all stakeholders in order to assure investors. The above measures should be taken as a package, not "piece-meal" measures, for them to work. One cannot, and should not, expect a sound industrial strategy and good industrial policy to work in a vacuum created by an environment of political instability, bad governance structure or a corrupt regime. It is equally important for the government to insist that all investors follow the priorities required and dictated by the national industrial policy and plan. Additionally, continuous monitoring, assessing and re-evaluating are the best guarantees to safely achieve the overall objectives of the NIS on time, cost and quality.

## CONCLUSIONS

The destruction to Sudan due to the war has been huge, deep and unimaginable. The industrial sector has suffered from an almost complete wipe out with 90% of its establishments seeing complete or partial destruction. Rebuilding the sector after the war is going to be equally challenging.

The first challenge after restoring safety and security, however, is to try to re-establish services and maintain the infrastructure. This should be accompanied by an industrial survey to help understand the depth and breadth of the destruction. This should be done during the first phase of the rebuilding process that should start immediately after the war ends.

The second phase would be primarily concerned with formulating a sound industrial strategy and an associated industrial policy and plan. This includes a serious look at the industrial law in order to account for the new realities after the war and accommodate the urgent needs of the rebuilding process.

The industrial strategy is a task for the experts and specialists, not politicians, and should cover the long term of, say, 20-50 years. This will take it out of the political conflict and competition and will assure the country of a scientific, stable development plan that is agreed upon between all stakeholders. The role of the government in this respect is to implement and monitor the implementation phase. Achieving the required policy co-ordination and commitment needs leadership and accountability at the highest levels of government.

It is proposed to create a quasi-official government agency for the national development strategy that is composed mainly of experts. The agency should be operationally independent while public accountability lies fairly and squarely on the shoulders of the government.


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Remember that industrial development is not cheap; it needs both capital and human resources. The government cannot do it alone; it has to be helped by genuine partnerships with private and foreign investors. This chapter has discussed how such a partnership can work in practice and defined the role and ideal contribution of each party.

This chapter has highlighted some of the huge challenges to rebuilding Sudan's industrial sector after this damaging war comes to an end. It is also a contribution towards formulating a national industrial strategy for Sudan as a step towards the industrialisation of the country as a part of a comprehensive National Development Plan, while achieving the UN's 2030 Sustainable Development Goals.

## CLOSURE

Finally, one should remember that, thanks to knowledge accumulation, technological development and learning from other nations' experiences, Sudan can roll back time and achieve a level of development in 20 years that took America, Japan and China 50 years to reach starting from a similar point in their development histories.

The route ahead is long and requires the collective efforts of all the country's citizens, each of them as they can offer, to build a bright future for the generations to come.

### Disclaimer:

Although the author of this chapter is an employee of Airbus, UK, the views in this chapter are his own and do not represent any kind of official statement of Airbus Operations Company in any way shape or form.

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## BIOGRAPHY

**Dr Adil Ahmed Dafa'Alla (PhD; C.Eng; EurIng)** graduated in Mechanical Engineering from Khartoum University, Sudan in 1981. He undertook postgraduate studies at UMIST, England, and was awarded his PhD in 1988. Dr Dafa'Alla joined Airbus UK Ltd in 1996, and has vast academic and industrial experience. As part of his quest for continuous development, he has become a Chartered Engineer (C.Eng.) followed by EurIng, testimony to his high standard of professional experience and conduct. His research interests cover aspects of CFD, aircraft safety and airport capacity planning issues. Coming from a Sudanese background, he also has a special interest in topics related to education, industry and sustainable development in Africa. His research activities are reported in a number of international journals and conferences in addition to many technical reports. He is an active member of WASD and has been an Associate Editor of its flagship journal WJSTSD since its inception in 2003.


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