Strategically Leveraging Infrastructure and Financing Options for Sustainable Economic Growth in Resource-based Economies

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Authors’ contributions

This work was carried out in collaboration among all authors. Author SSN designed the framework of the study, performed the literature review and research, wrote the protocol and wrote the first draft of the manuscript. Authors GS and LD contributed sections of the study relating to their areas of expertise, added to the literature review. All the authors engaged in multiple discussions to make sure that multiple points of view were represented on what can be a polemical topic. Author SN and GS contributed to final copy-editing and revisions. All authors read and approved the final manuscript.

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ABSTRACT

This paper proposes solutions and next steps toward developing a balanced approach that strategically leverages existing infrastructure for a diversified economy and sustainable growth for resource-based economies. It includes expanding financing opportunities in these countries with a combination of infrastructure policies and energy technologies and capturing the opportunities using supply chain technologies. The goals are to avoid both “debt traps” and “Dutch Disease” by leveraging existing infrastructure within a plan that incorporates supply chain management the prudent use of available financing and strategic partnership, such as China’s Belt and Road Initiative and Saudi Arabia’s Vision 2030.

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1. INTRODUCTION: DILEMMAS OF DEVELOPMENT

A widely read *New York Times* article (Casey & Krauss, 2018) was highly critical of the $19 billion of loans that China made to Ecuador for infrastructure, including a controversial hydroelectric dam, bridges, highways, irrigation, schools, and health clinics, not only for alleged corruption but also for the fact that Ecuador collateralized its petroleum reserves [1]. According to the terms of the deal, if Ecuador cannot pay with cash, the Chinese government can be paid in petroleum.

When the price of oil collapsed in 2014 and failed to recover for years, Ecuador found itself unable to make payments on its loans. Rather than subjecting Ecuador to the kinds of austerity programs that typified those required by the IMF or World Bank loans, when a country saw itself on the verge of default, China collected the oil, which at one point constituted 80% of its total production. Ecuador’s dependency on oil revenues to pay for its public sector and state-owned entities meant that to lose 80% of its oil income was a potentially catastrophic blow to the country [1].

Ecuador had to cut more than 1,000 public jobs and make reductions in social program spending, subsidies, and government agencies [1]. According to recent reports, the problem with the infrastructure is that it was not designed to be of the appropriate size for the use, and while electricity is generated, in the remote areas where it was needed most, critics say it is very expensive and unreliable. Instead of 10 cents (U.S. per kilowatt hour, it can be as high as 50 cents), which creates a demand for gas and also solar water heaters [2]. Critics also claim that in addition to being expensive, with a high-interest loan (7% per annum), the dam is falling apart [1]. Even if the *New York Times* article was overly negative, the fact remains that Ecuador is in debt and the much-needed infrastructure is not likely to contribute in all the ways it could, simply because the country now lacks capital and liquidity.

And, Ecuador is not alone. Venezuela has also availed itself of loans from China, Russia, and other countries. It, too, pledged its oil reserves, essentially allowing external ownership of a significant percentage of its reserves. Venezuela took out 17 loans between 2005 and 2016 for a total of $63.3 billion [3]. The loans were granted by the China Development Bank and also China Ex-Im Bank. In 2018, President Maduro negotiated another $5 billion in exchange for a "strategic partnership" to exploit Venezuela’s gold reserves [4]. It is useful to keep in mind that the loans from development banks and Ex-Im banks do not necessarily generate local jobs. As has been the case in reconstruction loans since the Marshall Plan, many of the construction projects are viewed as economic stimulators for engineering firms and equipment/materials providers from the country providing the loan [5].

In Africa, similar situations have occurred. In Zambia, at least $30 billion in loans from China has been secured (Hurley et al. 2018), with Zambia’s cobalt and other scarce resources committed to China [6]. If Zambia defaults on their loans, according to critics, China will have the option to take over operations of the mines and the infrastructure.

In the extremely strategic tip of the Horn of Africa, in 2018 the Djibouti government turned over to China its new deep-water port and naval base after defaulting on its $1.5 billion loans. Such negative experiences have led to suspicion of China’s motives, although China’s stated goals are to establish mutually beneficial trade relationships and are clearly laid out in the Belt and Road Initiative [7].

After pledging so much of their petroleum production, gold, or other natural resources, what will the countries do? With so much of their revenue flowing to their creditors, how will they survive? In the past, in the case of loans from the IMF, the countries simply defaulted, which often had terrible repercussions in the financial markets, but did provide relief for the debtor country. It might be that countries such as Venezuela are thinking that they can simply do what they’ve done in the past: nationalize the oil and politely ask the foreign companies to leave. The companies that had to abandon their operations and investments grumbled, but eventually acquiesced. Will China be so
agreeable to re-nationalization of natural resources? Perhaps not. And yet, unless a country manages to shake off Dutch Disease and diversify away from dependency on a single export product, it has few options and must to try to wrest back control of the country's gold, oil, cobalt, or another valuable natural resource. Re-patriation or nationalization could trigger serious conflict, even war.

However problematic the terms of trade may seem at first blush, the fact remains that Ecuador, Venezuela, Argentina, and a host of African and Asian nations are in desperate need of infrastructure, particularly after the international banking crisis of 2008 which saw development funds, especially to countries with dicey credit ratings, come to a halt [8].

For primary product-dependent economies which have suffered from Dutch disease, they need to diversify and also invest and bolster the starved-out sectors of the economy that suffered as all investment flowed into the primary product (oil, minerals, etc.) Countries need infrastructure in all links of the supply chain. China has extended loans and technical assistance, as well as trade relationships, in order to strengthen the infrastructure of small resource-based economies. Other countries have also announced the desire to work with countries and broaden trade relationships. Saudi Arabia, in its Vision 2030, proposes a plan to facilitate global trade by the use of a new financial, trading, and warehousing hub. Great Britain is establishing new and deeper ties with Commonwealth and non-Commonwealth nations as they plan to leave the European Union.

2. CAUSES OF CRUMBLING INFRASTRUCTURE: THE RESOURCE CURSE AND DUTCH DISEASE

Richard M. Auty first coined the term, “resource curse,” in 1993, but economists had long observed that resource-rich countries, many times former colonies of the far-flung British, French, Spanish, or Russian empires, often suffered a disproportionate amount of corruption, income inequality, and lack of economic diversity in comparison with other countries [9].

Auty, who looked specifically at mineral economies in his seminal work, analyzed the economic activity and economic structure of Peru, Bolivia, Chile, and Jamaica, which produced silver, tin, copper, and bauxite. In each of the economies, the mining sectors drew away investment from agriculture, manufacturing, and other economies, leaving them unable to thrive. Further, the owners or the government officials who had control of the resources soon found it easier to live on passive income (“rent”) whether it be from the sale of specie or oil, or from various forms of tribute (another form of “rent”) than to manage and operate the extractive industries.

Thus there were serious disincentives for innovation, entrepreneurship, or any enterprise that might involve risk and delayed gratification. As the country became more dependent on its primary product, it became essentially a mono-economy. The resulting economic malaise came to be known as “Dutch Disease” and it is an outgrowth of the resource curse.

The term, "Dutch Disease," is widely used in economic development and financial literature to denote the economic malaise that occurs in an economy that experiences a dramatic increase in one single sector, to the detriment of the rest of the economy. It usually relates to primary products, such as minerals, petroleum, and it is particularly harmful in mono-economies that are dependent on a single export commodity. The term, "Dutch Disease," came into being when the Dutch economy experiences an influx of cash due to discoveries of gas in the North Sea, and the subsequent shift of investment from other parts of the economy to gas. It is interesting that many people erroneously believe that "Dutch Disease," refers to the tulip speculation in Holland in the 1630s, described by Charles Mackay in 1852 in Memoirs of Extraordinary Popular Delusions and the Madness of Crowds, which details the frenzy and herd mentality involved in speculator stock run-ups, and then the sell-offs leading to panics and collapse [10].

Dutch Disease harms resource-based mono-economies in many ways. Non-mineral industries starve from lack of investment. With a lack of investment, manufacturing and agriculture go into a steep decline, causing imports of food, clothing, and other manufactured goods to rise. Because of the competition for labor and the fact that the needs of the resource-based industry are relatively large, wages increase. Scarcity of housing and the dependency on expensive imports causes the cost of living skyrocket. In the meantime, an increase in the money supply results in steep inflation, and corruption becomes entrenched.
Corruption tends to be a prominent feature of resource-based mono-economies for a number of reasons. First, bribing or paying kickbacks is efficient, and a way to maintain political and economic control of the resource itself. Second, many of the countries are “high-context” societies in which family and group-affiliations are extremely important, to the point that there may be a cultural obligation to favor a person of one's family, party, or tribe.

From a purely monetary standpoint, it is possible to “inoculate” the money coming in from the sale of the primary product, but it requires discipline and a leader undisposable to absconding with the treasury. Norway is one mineral economy (oil) that has successfully inoculated its oil revenues. The Norwegian government has done so by adhering to a clear and transparent accounting of production and revenues from oil and gas, being willing to avoid using the revenue for unproductive government worker employment and sinecures. Further, the government of Norway established a rainy day fund, invested in education and infrastructure to support diversification, and supported the development of technology to further encourage economic diversification and the potential for value-added services.

Many countries have had difficulty avoiding spending resource revenue. Unfortunately, there are relatively few examples of successful neutralization or inoculation of the passive income that flows in as a result of mining or petroleum products, or other resource exploitation (hydroelectric energy or other mono-products).

Saudi Arabia's Vision 2030 is a far-reaching plan to inoculate oil revenue by not only investing it in education and infrastructure but also in economic diversification in areas where Saudi Arabia believes it could have a competitive advantage and to provide services to its neighbors. The core industries are technology, financial services and to become a global logistics hub [11].

Ndiaye, Razak, Nagayev, and Ng (2018) argue that small and medium business enterprises (SME’s) are the key to economic development in emerging economies like those found in African and Asian countries [12]. Their argument is supported by World Bank statistics that 600 million workers will be entering these economies over the next 15 years and that four out of five workers will be entering the small and medium business enterprise workforce. Ndiaye et al. point out that the unfavorable lending conditions in these countries will hamper this full opportunity to capitalize on the economic development that exists in these countries. The answer to enhancing financing opportunity in these countries not only lies with infrastructural policies but also by capitalizing on energy technologies [12].

2.1 Successful Inoculation of Rent or Resource Revenue

Corruption makes it difficult to choose good infrastructure projects and to invest in what is best for sustainable growth. Economists who specialize in economic development and trade often point to Norway as a good example of a country that, while resource-dependent, has successfully avoided the Resource Curse and Dutch Disease. As discussed earlier, Norway’s willingness to inoculate its oil revenues made it possible for them to avoid Dutch Disease [13]. However, to truly understand the reasons for the decisions, one must consider Norway's history, its cultural values, and its institutions.

Norway's framework of religion, values, and beliefs created a situation at variance with that of other cultures, particularly post-colonial nations. The discovery of oil in the North Sea occurred at a time when Norway was already developed, with a social structure which resonated with their historical post-Reformation Lutheran values. As opposed to other petroleum-rich countries, Norway is a “low-context” culture. In “low-context” cultures, individuals and individualism are valued, and a contract or written document is valued over a verbal promise, or an obligation to a family group. Rule of law is valued, and forms of paying “tribute” that often translate into payoffs, bribes, and non-compete contracts to family or party members, are against the law.

Such a situation makes it easier to select infrastructure projects that are of most benefit to the country and a sector of the industry, rather than being a convenient vehicle, construction and materials contracts to family and friends, or for graft or diversion of funds.

In Norway’s case, a diversified economy before the discovery of oil resulted in the construction of infrastructure. Further, with its abundance of streams and rivers, Norway has been able to construct hydroelectric dams, providing electricity throughout the country. Not needing hydrocarbons for the generation of electricity,
Norway was able to export almost all the production, resulting in cash flow that was not needed for basic services in the country. Thus, with the infrastructure already firmly in place, and an existing framework of infrastructure and population to absorb shocks, in addition to a fairly diversified economy with fishing, tourism, agriculture, manufacturing, and shipping, Norway had industries that could be supported, and an educated and disciplined workforce prepared to innovate. Norway followed the path of energy revenue inoculation to the best of its ability. It saved money in a rainy day fund, bolstered its education facilities, health and welfare, particularly for the very young and the very old [13].

Perhaps the most interesting and high-impact way that Norway invested its funds was to set up entrepreneur and start-up support funding. The Norwegian state oil company (Statoil, now Equinor), takes a position in value-added technology and looks strategically along the entire supply chain to make sure that investment is being placed in order to avoid bottlenecks.

In addition, the Norwegian government has used its funds for sustainable purposes, which include alternative energy and energy efficient devices. In addition, it supports cultural activities that support values that encourage recycling, fuel efficiency, openness and transparency.

The fact that Norway has a long reputation as being one of the most transparent countries where corruption and conflicts of interest are abhorred has contributed a great deal to successfully avoiding Dutch Disease.

2.2 Infrastructure Needs to Extend along the Entire Supply Chain

While the term “supply chain” seems to refer to a linear flow of information or activities, a supply chain is actually a web or a network which encompasses all of the elements required in the design, production, and distribution of a product. It starts with the design of the product, the inputs required for production, and the relationships between suppliers and the manufacturer. With globalization, supply chains are more important than ever because the inputs may be sources around the world, and also because communication and customized production (3D printing-enabled production, for example), has made small batches and individualized orders a reality. With the demise of store-front retail and the rise of online marketing and sales, supply chain coordination is particularly important. At the heart of the supply chain is infrastructure, and so infrastructure planning, mapping, and maintenance must be at the heart of an ambitious economic development plan, particularly one that seeks to diversify a resource-based mono-economy.

Saudi Arabia, which is perhaps one of the largest resource-based mono-economies in the world, recognizes the importance of the supply chain in global economic development, and it wishes to position itself to be a facilitator of global commerce by becoming an infrastructure hub. It will use its oil and gas revenues to finance the diversification venture, and its investment plan seeks to inoculate its oil revenues and to use them to strengthen networks with other countries and to facilitate interdependent commercial ventures.

Using Norway as one of its models, the Kingdom of Saudi Arabia announced its plan, Vision 2030, which sets out ambitious goals to use oil revenue to effect social transformation, economic health in all sectors of the economy, and to become a major international logistics hub where companies will come for value-added transformation, financial services, easy access to all points in Europe, Africa, and Asia, and a dynamic approach to investment in new technologies [11].

Innovation with a serious impact is the key, and Saudi plans to start by investing in alternative and relatively clean energy, and to expand its trade-based economy by expanding its products and services. The Vision 2030 plan includes specific details, including the first step to “fortify and extend our interconnectivity and economic integration with other Gulf Cooperation Council countries. We will strive to complete the process of implementing the CGG common market, unifying customs, economic and legal policies, and constructing shared road and railway networks [11].

To be effective, Saudi’s infrastructure will be multi-purpose. It will benefit at least two industries, and also communities. In Vision 2030, the infrastructure and cloud-based trading and promotional platform will support agriculture, manufacturing, transportation, tourism, technology, chemicals, information technology, cybersecurity, and more [11].

Infrastructure will stimulate investment at all levels of society, and although the Kingdom is
discussing making large investments, they are targeting investment in medium-sized, family-owned, and small company goods and services. Infrastructure their investments and be planned with the businesses envisioned, and a structure for optimizing investment by attracting business-to-business partnerships.

2.3 Supply Chain Analysis for Decision-Making to Avoid Dutch Disease

Since supply chain management and the subsequent analytics has an overarching goal of optimizing each of the following: the flow of materials, the flow of funds, and the flow of information. With this in mind, the analysis of each of these strategic elements depends on strong decision-making tools and an educated workforce to understand not just the mechanics of these analytics but also the implications of the results. The number of analytical tools available are almost limitless but include regressions and correlations, both independent and dependent (ala time series and forecasting), data mining, optimization techniques, and network analytics. Decision making and the choice of analytical tools is dictated by the need to supply the customer as efficiently as possible while eliminating bottlenecks to provide that product or service to the customer [14]. Specific bottlenecks can include bureaucratic, transportation, energy supply, inputs supply, water, and sustenance (food, water).

Bottlenecks can occur at all phases of the supply chain, both in the flow of inputs for transformation in the production of the product or service and in the flow of the products or service to the customer. The most destructive bottlenecks include the following:

Bottleneck 1 - Bureaucratic: Some countries use bureaucratic procedures, permits, concessions, taxes, certifications, and more in order to create a gateway and protect their markets. Sometimes there is a compelling positive reason for the red tape: it may be necessary if there has been abuse in the past, and there is a need to keep tight control on what comes into the country. Too often, though, such procedures can be circumvented in countries with fragile ties to the rule of law, resulting in corruption and essentially no control at all.

Bottleneck 2 - Logistic: In situations where there is inadequate warehouse space, roadways, bridges, or other basic means of transport, there can be serious problems. Using supply chain analysis and simulations, the flow can be controlled in order to optimize traffic and avoid “log jams.”

Bottleneck 3 - Energy: Power outages can cause serious bottlenecks, often made much worse by the unpredictability of them and the fact that they often lead to cascading bottlenecks, if not an outright failure of the systems. It is important to have good data about the true capacity of the system and to schedule energy use in order to not precipitate blackouts and outages. Smart meters are often very effective.

Bottleneck 4 - Inputs: Having either too many or not enough inputs to maintain production can result in a terrible bottleneck. The key is to have a realistic notion of true pace of manufacturing and to schedule it correctly.

2.4 Necessary Information in Supply Chains

The main points of information that are often stipulated in supply chain efforts are sometimes generalized to facilities, inventory and material (flows and movements), distribution channels, customer demands, supplier availabilities, and information technology [15].

The three “legs of the stool” of an efficient supply chain system, those being of course movement of goods and materials, the efficient flow of funds, and the efficient flow of information, all three are vitally important. The effective use of human capital is included in all three legs of the stool. The flows of information cannot be assumed or overlooked. Information flows communication supply and demand needs, and even more importantly, the timing of those needs. Poor information timing between customers and suppliers is the main driver causing bottleneck build ups. Mapping capacity and flow levels through operations are absolutely vital to understand the flows of customer demands by which supplier availability can be matched.

The strongest cases of supply chain thinking are centered around getting the product to market in the shortest time frame, converting the product to cash, and eliminating the barriers to accomplish these goals. Some strong cases exemplify these concepts. One such case resides with Walmart’s cross-docking initiatives in its warehouse distribution centers. In these distribution centers,
the product is delivered to a distribution center where the product is disseminated to various trucks supplying various retail centers.

Cross-docking is a technique in which, figuratively, a distribution center receives the product from a supplier and immediately loads it back onto an outbound truck to a customer, often without taking ownership of the product or minimally taking ownership of the product before transferring the ownership of the product to the customer. This minimizes the cost. Walmart has led industry advances in this technique by efficiently breaking the product from its pallets (or larger packaged units) into smaller units then using a system of conveyors to load the product into its trucks bound for its retailing centers. The product is often delivered from the supplier to the retail center and can be conceptually on the shelves for sale to the customer on the same day. This can only occur on a large scale with the support of strong technology and information analytics.

Much depends on the kind of infrastructure and the local contexts and dominant industries. In the case of regional airports in the U.S., Ferarri et al provide the results of studies on the local economic impact in the communities of 260 airports [16]. Wholesale and retail trade account for the bulk of the economic effect, with no impact on manufacturing.

Airport expansions resulting in an increase in the numbers of tourists can have a number of positive and negative impacts. For example, Puppim de Oliveira studied the impact of planned governmental investment in infrastructure to expand tourism in northeastern Brazil, an underdeveloped area with beautiful coastal regions which are appealing to tourists, but which have very fragile ecosystems [17]. There are both negative aspects of tourism and the negative can outweigh the positive without very careful planning, legislation, and control.

The reasons favoring tourism obviously include large inflows of revenues and cash. The alternative reasons against, however, start with issues of liability. Tourists tend to find ways to hurt themselves in surprising ways despite extensive safety planning and careful precautions. Several cases from Disney and other amusement parks provide multiple examples of this dynamic. Liability risk is severely enhanced when natural ecosystems and humans are brought together. Wildlife, including examples like snakes and caiman, enhance dangerous risk to the human race if the two are intermingled. Many other reasons against tourism existed, not the least of which includes the erosion of the ecosystem. Human visitors tend to degrade and run down natural ecosystems when their presence is introduced into the ecosystem.

2.5 Initial Cohesive, Unifying Vision: One Belt, One Road

In 2013, China announced its “One Belt, One Road” plan. It was later dubbed the Belt and Road Initiative, or BRI for short. It unified and coordinated many of the development initiatives and massive overseas infrastructure projects that China had been funding for the last 10 or so years [8].

The One Belt, One Road (OBOR) or Belt and Road Initiative (BRI) initiative is, in many ways, an extension of the kinds of infrastructure loans already extended to Africa, Asia, and South America, as in the examples of Ecuador, Venezuela, and Zambia presented earlier [7].

The unifying vision, the BRI, is a plan to create an updated “Silk Road” and builds on the ancient trade caravan routes that made their way from China, carrying spices and silk, too eager markets in India, the Middle East, and Eastern Europe. Along the way, the traded as they rested at Caravanserai such outposts as Samarqand (in modern-day Uzbekistan) and in Baku (modern-day Azerbaijan).

The BRI, consists of the Silk Road Economic Belt, which is terrestrial. It involves pathways moving from China to Central Asia, South Asia, the Middle East, Africa, and then Europe. The Maritime Silk Road establishes new shipping lanes through the world’s oceans and connects ports.

China has specific policy goals for the Belt and Road Initiative, and they include improving inter-governmental communication and collaboration, building infrastructure (ports, railways, highways, dams, schools, stadiums, bridges, housing) in many different countries (65 to be exact), developing “soft infrastructure” by improving trade agreements, regulatory standards, financial integration (one goal is to make the Renminbi (RMB) the dominant international currency), and strengthening people-to-people connections through exchanges. The exchanges include students, experts, writers and artists. The China
Belt and Road Initiative also promotes cultural exchanges and tourism.

The BRI builds on what has already been happening for at least 20 years. For example, China has been investing in foreign companies and property, and it’s been establishing cultural centres in universities. For example, Confucius Centers were set up at universities, sometime around 2005. They promoted China’s culture, including arts, history, language, film, and literature.

The BRI-based infrastructure in the participating countries is partially (or largely) paid for by means of loans to countries who want the infrastructure. China keeps a part, but the country takes out loans. Also, Chinese companies can qualify for loans.

China has made financing available through the Asian Infrastructure Investment Bank ($100 billion), the Silk Road Fund ($40 billion), the Chinese Development Bank (CDB) ($890 billion), the Export-Import Bank (EXIM), and the People’s Bank of China (PBOC) (for Chinese companies working on Belt and Road Initiative [18].

If this looks a lot like what the World Bank and the United Nations Development Fund have been doing for years, it’s probably not by accident. In fact, Belt and Road Initiative is offering loans in many of the same countries where the World Bank has issued loans. The BRI makes the argument that when the World Bank and the International Monetary Fund (IMF) make loans, they do so with “western” banks, and those banks attach a large number of conditions, many of which are unpalatable and/or ideologically coercive in the eyes of some of the countries. Further, China argues that it is a “South-South” initiative that seeks to unite developing nations and create access to markets when none existed before.

2.6 BRI Infrastructure vs. Western Development Funded Infrastructure

There is a difference, though, between BRI loans and World Bank or IMF loans. If the country defaults on their loan, it does not affect banks or investors. Instead, it impacts the government of a foreign country. China has protected its interests, and when it signs a loan, it stipulates that if there is a default, the control of the infrastructure will go to China. So, China would receive, for example, a 99-year lease to operate a strategically located deep-water port. Further, China negotiates the ability to put install a military base. This is precisely what happened in the case of Djibouti.

Further, BRI loans come without governance conditions. They are essential “no strings attached,” which means that they do not have to comply with transparency, anti-corruption, or human rights guidelines. In some cases, dictators and repressive regimes that often do not have access to loans or infrastructure development have taken advantage of conditions that are favorable to their own agendas. Further, countries with resources may also sign contracts to sell the products of their minerals, oil, or other good. There may be a production sharing agreement, and if the BRI is building roads, schools, ports, electric transmission lines, etc., then a corrupt government leader can point to the accomplishments and benefits to the country. It is then easier to spend the country’s share of the production sharing agreement on goods and services more to the despot’s taste; say, a lavish villa and a large yacht.

This is not to say that everyone embraces the Belt and Road Initiative. Russia, India, and the United States are worried about China’s motives and also believe that there could be conflicts with markets, shipping lanes, and competition for scarce resources. There are several YouTube channels and websites that have published deep and probing critiques of the Belt and Road Initiative. They tend to be biased, without presenting two sides of the story, and one wonders if they are funded by competing interests. Most have Patreon accounts and issue pleas for individual patronage and support, which gives the impression of a populist, grassroots, crowd-sourced show, which is precisely the impression that an institutionally-backed show might wish to give.

Where countries have not integrated the infrastructure into a larger plan, there has been some pushback. For example, critics such as those in the Philippines accused the BRI of charging 2 – 3% interest instead of the 0.25 – 0.75% from Japan, as well as a cost of projects being 1,100% more than those from Japan [19]. What the Philippine critics did not take into consideration is that the Philippines had a terrible credit rating and no one (including Japan) would lend them money for infrastructure projects.

Some of the most vulnerable-to-default countries and their Belt and Road Initiative projects are in
Table 1 [20]. The projects are for infrastructure, which is needed for economic diversification. However, without additional investment strategically placed at all points in the supply chain, it is possible that the infrastructure will be underutilized, the economy will not diversify, and in such case, as in the case of Ecuador, the infrastructure could actually have an injurious impact on the economy.

That said, without infrastructure transportation, water, and energy projects, the countries have little chance of effectively diversifying. But to optimize the economy and to create products with multiplier effects, it makes sense to invest in complementary industries. For example, many people think of tourism as the perfect antidote.

There is not a central repository or register of One Belt One Road (or Belt and Road Initiative) projects. Instead, it is necessary to compile information from different sources, which makes it more difficult to create models for coordination and planning of how to strategically invest and how to optimize supply chain networks [21]. Here is a list of Belt and Road projects that were completed as of March 2018 [22]:

Trade-based economic growth is at the heart of an infrastructure-led economic diversification and the goal of inoculating resource revenue and directing it to productive investments. Again, an initial study must be made to make sure that the investments are made along with all links of the supply chain.

In economic history, there was the school of mercantilism that applied to the period, 1500 to 1776, with tenets that included nationalism to promote exports, limit imports, and the accumulation of wealth. Imported raw materials would be duty-free and used to manufacture goods for exportation to enhance the inflow of funds to accumulate needed wealth in the country.

There has been a rebirth of mercantilism concepts under the tag of neomercantilism again encourages exports, discourages imports of final goods, controls capital movement, and centralizes currency decisions in the hands of the central government. Most of the infrastructure projects identified above are in relatively underdeveloped countries seeking to improve their economic well-being. Application of the tenets of neomercantilism offers a logical approach for seeking improvement to a country’s economic condition.

2.7 Strategic Planning Elements for Leveraging Infrastructure for Economic Development

It appears that the infrastructure expenditures on the projects noted above have not attained the desired outcomes by means of complementary industries/companies and they have not achieved the goal of having desired diversified economies. Unfortunately, most of them seem to have not stimulated investment in complementary industries needed to leverage their economies.

There are likely several options that could be considered to leverage major infrastructure projects and to fill the economic gaps that exist. One might be to initiate and exercise strategic planning processes that would include setting meaningful objectives and goals supported by the necessary resources to attain them while supporting the initial infrastructure.

The planning process would begin with an environmental analysis to assess the external conditions that might affect, either favorably or unfavorably, the desired industries needed to complement the infrastructure project under consideration. Items to evaluate might include metrics such as population, economic trends, potential political influences, possible industry regulations or tax impacts, technological trends, and a realistic assessment of the existing or potential competition.

An internal resource analysis should follow to determine the strengths and weaknesses of the industry under consideration. Categories to include would be the adequacy and quality of human resources, the financial condition of the industry or company, and the availability and quality of necessary facilities and equipment. Meaningful vision and mission statements should be drafted and adapted to provide a general sense of industry or company direction.

To provide a broad strategic aim for the organization, statements of purpose that express management’s fundamental intentions for the future development of the organization, objectives should be established. Under each of the objectives, one to three goals should be developed to provide time-oriented targets required for achieving the defined objectives. These goals should be specific, realistic, consistent, hierarchal, with a time dimension.
Table 1. Infrastructure and BRI debt of different countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Infrastructure</th>
<th>BRI Debt</th>
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<tbody>
<tr>
<td>Djibouti</td>
<td>Port / Naval Base</td>
<td>$1.5 billion</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>Railroad</td>
<td>$4.5 billion</td>
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<tr>
<td>Pakistan</td>
<td>Energy / Pipeline</td>
<td>$40.0 billion</td>
</tr>
<tr>
<td>Maldives</td>
<td>Airport</td>
<td>$1.0 billion</td>
</tr>
<tr>
<td>Laos</td>
<td>Railroad</td>
<td>$6.0 billion</td>
</tr>
<tr>
<td>South Africa</td>
<td>Infrastructure</td>
<td>$14.7 billion</td>
</tr>
<tr>
<td>Montenegro</td>
<td>Highway</td>
<td>$1.5 billion</td>
</tr>
<tr>
<td>Mongolia</td>
<td>Hydropower/highway</td>
<td>$2.5 billion</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>Pipeline</td>
<td>$2.8 billion</td>
</tr>
</tbody>
</table>

Source: Hurley, et al. 2018

Table 2. List of sanctioned projects

<table>
<thead>
<tr>
<th>Country</th>
<th>Completed Projects</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>Huawei logistics center</td>
<td>$1.5 billion</td>
</tr>
<tr>
<td>Iran</td>
<td>Rudbar Lorestan hydropower dam</td>
<td>$578 million</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>Khorgos dry port</td>
<td>$245 million</td>
</tr>
<tr>
<td>PakistanGwadar</td>
<td>Port construction of breakwaters</td>
<td>$123 million</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>Hambantota deep sea port Phase I, II</td>
<td>$1.3 billion</td>
</tr>
<tr>
<td>Cambodia</td>
<td>Natl. Road No. 214, Stung Treng-Mekong Bridge</td>
<td>$117 million</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Sumsel-5 power plant</td>
<td>$318 million</td>
</tr>
<tr>
<td>North Korea</td>
<td>New Yalu Bridge</td>
<td>$350 million</td>
</tr>
</tbody>
</table>

Under construction

<table>
<thead>
<tr>
<th>Country</th>
<th>Project Type</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>Payra power plant</td>
<td>$1.65 billion</td>
</tr>
<tr>
<td>Laos</td>
<td>China-Laos railway</td>
<td>$5.8 billion</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Peshawar-Karachi motorway</td>
<td>$2.84 billion</td>
</tr>
<tr>
<td>Israel</td>
<td>Haifa Bay Port</td>
<td>$1.16 billion</td>
</tr>
</tbody>
</table>

Announced

<table>
<thead>
<tr>
<th>Country</th>
<th>Project Type</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mongolia</td>
<td>Tavan Tolgoi rail project</td>
<td>$1 billion</td>
</tr>
<tr>
<td>Turkey</td>
<td>Third nuclear power plant</td>
<td>$25 billion</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Kohala hydropower plant</td>
<td>$2.4 billion</td>
</tr>
</tbody>
</table>

The pursuit of the defined objectives and goals requires a real commitment of resources including human capital, financial resources, facilities, and equipment. The likelihood of economic success could be significantly enhanced by the application of a formal planning process as the one described above rather than a random solicitation of an industry or company that may or may not attain the desired complementary economic goals.

**First steps:** There are a number of options for leveraging infrastructure for productive investment in complementary industries such as manufacturing, logistics, and finance.

**Option A: Complementary infrastructure needed for balanced economic development:**

A key to achieving complementary infrastructure needed for economic development occurs when countries drop unnecessary regulations and tax assessments on international imports and trade especially when international investment in infrastructure is occurring. Many domestic SMEs look to international opportunities for partnership and financing especially in developing technology and expertise. These activities need to be promoted and encouraged to help developing countries and entities harvest a country’s natural resources.

**Option B: Business-to-business loans that will be productive:**

Because supply chain initiatives and companies depend on the development of an SME driven economy, which will in addition drive the economic development of that country, incentives for developing this corroboration are essential. Incentives can take many forms, but tax incentives are the first thought in identifying incentives. A developing country must provide tax incentives for companies to work together, to allow small and medium enterprises to collaborate and work together, and for the general development of infrastructure. These tax
incentives are especially important when SME’s and partners borrow money. The tax incentives, especially on loans and financing alternatives can drive the economy with large investments from outside (non-domestic) firms.

Option C: Import substitution / exports to nearby countries / companies:

Technology and innovation, especially technology and innovation that is imported or partially imported needs to be supported with training and education. This begets the internal development of technology that can supplant the necessary importing of technology for a developing economy that is devoid of such a technology. While importing expertise and technology prevents "reinventing the wheel," the sooner a country is developing its own technology the quicker the economy begins to grow and stand on its own especially in those countries where the resources are available but not necessarily fully developed.

3. SUMMARY AND CONCLUSIONS

This paper has proposed steps toward developing a balanced approach to strategically leverage existing infrastructure for a diversified economy and sustainable growth. Economists have studied how resource-rich countries often suffer a disproportionate amount of corruption, income inequality, and lack of economic diversity than other countries. These countries, like Ecuador and Zambia, are often also susceptible to a form of legalized predatory “loan sharking” when they borrow funds against these natural resources from some foreign countries (like China) to develop infrastructure including roads, ports, etc.

4. RECOMMENDATIONS

It is recommended that countries assess their economies and strengthen those which provide employment and diversified, while also avoiding debt traps that involve high-interest loans for infrastructure that does not build the country’s capacity to provide non-mono-economy products. Debt traps can be avoided by investing in economic diversification and building global networks through existing programs that help develop a country’s infrastructure and provide markets and support for industries that are not a part of the mono-economy. The next steps should be to identify opportunities in the countries at most risk of falling into a debt trap and to conduct a close evaluation of resources, competitive advantages, financial institutions, transportation, warehousing, potential markets and marketing. Then, strategic investment plans can be made.

Business-to-business relationships that develop products that leverage domestic capacity and infrastructure could have multiplier effects and turn what is, in essence, a dormant investment into a very sustainable one. This paper proposes solutions that are based on the advanced technology based educational sciences in the modern business including technology, infrastructural solutions, and financial mechanisms to avoid the predatory traps that many developing countries fall victim to. Modern supply chain technology of high-consumption products in the country provides an example of how technology can be evaluated to see where local companies and countries could supply products and services to help advance the infrastructure in these developing countries. Although import-substitution is not the overall goal in this case; in essence, economic participation is the goal, along with benefits that avoid income inequality.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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