TRADE & INDUSTRIAL POLICY STRATEGIES

ENHANCING INDUSTRIAL RESILIENCE IN SOUTH AFRICA

FINAL REPORT – WORK OUTPUT 1

RESPONSES OF INDUSTRIAL PARKS TO COVID-19 AND FUTURE PANDEMICS

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OVERVIEW

This document forms part of a set of outputs for the project: ***Support to Industrial Parks and Special Economic Zones for COVID pandemic prevention and response: Enhancing industrial resilience in South Africa***.

This document covers Work Output 1: Support Industrial Parks and Special Economic Zones (SEZs) in responding to COVID-19 through the development of national guidelines for Industrial Parks and SEZs on COVID-19 and future pandemic resilience responses.

Please refer to the Table below for detail on each of the three reports.

Brief description of the three documents associated with the project

	TITLE	SHORT DESCRIPTION
Output 1	National guidelines for Industrial Parks and Special Economic Zones on COVID-19 and future pandemic resilience responses	Provide a first level contextualisation regarding the concept of resilience within the domain of industrial parks and to offer guidance on measures which need to be considered for a process of enhancing the resilience of industrial parks and special economic zones in South Africa.
Output 2	COVID-19 economic recovery plans to selected Industrial Parks and Special Econimic Zones within the framework of the National Eco-Industrial Park Framework	Provides guidance on recovery measures that industrial parks and special economic zones can adopt in order to support production to pre-pandemic levels or better.
Output 3	Standards Operating Procedure on pandemic prevention/response in Industrial Parks and Special Economic Zones	Articulates disaster risk reduction and pandemic prevention response measures for industrial parks and special economic zones.

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ABBREVIATIONS

CDC	Coega Development Corporation
CSEZ	Coega Special Economic Zone
CSIR	Council for Scientific and Industrial Research
DFID	Department for International Development (DFID)
dtic (the)	Department of Trade, Industry and Competition
ELIDZ	East London Industrial Development Zone
FDC	Free State Development Corporation
IDZ	Industrial Development Zone
IPP	Independent Power Producer
NMBLP	Nelson Mandela Bay Logistics Park
PPE	Personal Protection Equipment
SDGs	Sustainable Development Goals
SEZ	Special Economic Zone
TERS	Temporary Employer-Employee Relief Scheme

1. INTRODUCTION

1.1. Context

The coronavirus outbreak and subsequent measures taken to control the spread of the virus affected firms across the world through lockdowns, slower economic growth, and disruptions in supply chains, among other things. In South Africa legislative requirements were also introduced on how individuals and firms were able to interact, work and trade. The pandemic impacted on the ability of many businesses to operate, and highlighted that the current context in which industrial activity is promoted had gaps, and were not necessarily resilient to such shocks.

Preparedness for shocks is part of good business practice and supports business continuity. The ongoing impact of COVID-19 and the social and economic responses to this health pandemic has resulted in shifts across the global and domestic political economy in how businesses, supply chains and consumers behave in the near future. For emerging and developing countries, COVID-19 impacts, alongside climate change and the recent invasion of Ukraine, have deepen pre-existing structural constraints on growth, which is likely to persist in the medium to long term.

The initial response to the COVID-19 pandemic in South Africa and in many countries across the world was a “hard lockdown” when economic activity and company operations were suspended, borders closed and most companies cut off from local and global value chains including supply chain networks. The impact of COVID-19 on South Africa’s trading partners has also negatively affected export demand for South African goods and services. For commodities in contrast there was significant growth as quantitative easing and other government support measures were introduced to bolster growth in the global north as well as in China. African countries had less fiscal room to support economic recovery with measures needed more broadly to support economic growth and expand access for the most vulnerable groups in society to participate in the economy (Makgetla, 2021).

The type of disaster witnessed with COVID-19, where a health pandemic negatively impacted on industry is unlikely to be a unique occurrence, as evidence suggests that industry is vulnerable to geopolitical tensions and effects of climate change. Domestic events such as loadshedding, water shortages, and other extreme weather patterns will in all likelihood impact on businesses.

Firms in industrial spaces such as industrial parks and special economic zones, while no more severely impacted than other firms, can be offered an opportunity to be protected against some of the impacts and continue trading. These industrial spaces, and the support as well as the economic benefits they provide, could contribute to continuous economic development even in periods of uncertainty.

On the other side of the coin, lack of preparedness, poor industrial infrastructure and no specific support measures in industrial sites means that they offer nothing unique, and is a missed opportunity. In the worst case, lack of preparedness may see some industrial sites closing down, as was the case in some countries (such as in Vietnam), and less new industrial sites and economic infrastructure (roads, rail, electricity and water infrastructure) being put in place.

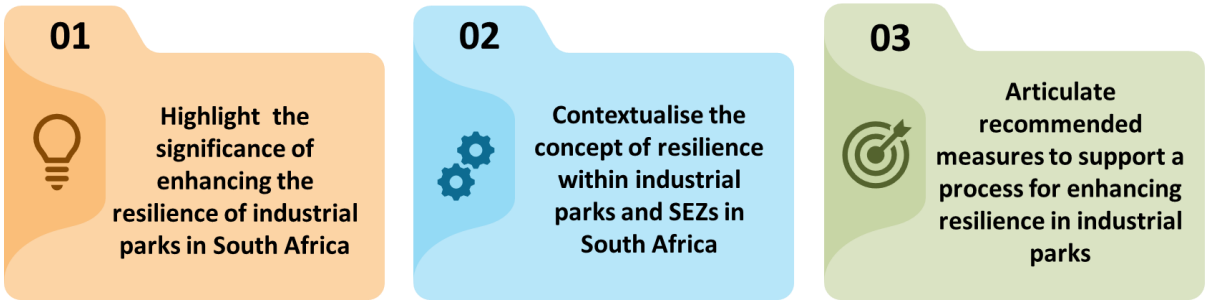
Prioritising resilience measures and preparedness in industrial spaces is therefore economically strategic for countries. Such measures include mainstream disaster risk management and building greater resiliency at industrial sites. This report provides an approach to support the embedding of resilience measures in the management and governance of industrial sites

1.2. Purpose and objective of the report

Establishing resilient industrial parks which are able to effectively respond to unprecedented events and ensure business continuity for firms is paramount for South Africa. As a response, the overarching purpose of this document is to provide a first level contextualisation regarding the concept of resilience within the domain of industrial parks, and to offer guidance on measures which need to be considered for enhancing the resilience of industrial parks and special economic zones in South Africa.

The specific objectives of the report are as follows (see Figure 1):

Figure 1: Objectives of the report



2. UNDERSTANDING THE CONCEPT OF RESILIENCE IN INDUSTRIAL PARKS

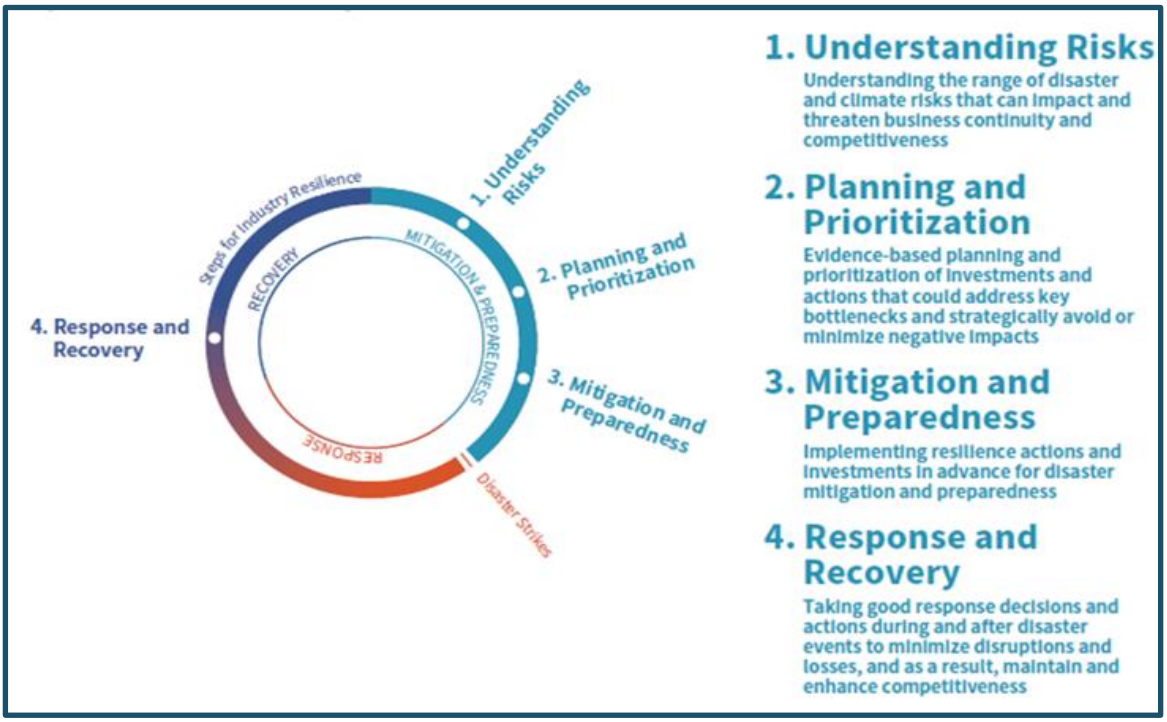
2.1. Overview of the concept resilience in Industrial Parks

Resilience as it pertains to industrial parks is a nascent topic and is not exhaustively studied. There is a shortage of literature providing meaning to the concept. However, in 2020, The World Bank issued the first publication that defined resilience in industrial parks as the ability of industrial parks, including firms and manufacturing sectors, to increase competitiveness by minimising losses and damages, and by achieving continuity and growth in the face of more frequent and intensifying disasters (World Bank, 2020). This indicates that the resilience of industrial parks, including associated firms, is a process cultivated over time through actions and measures prior and in anticipation of a disruptive event, with the aim of ensuring that the calamity of the event is minimised to such an extent that parks and associated firms can effectively bounce back.

Industrial park resilience is achieved through concerted planning and actions that address the various challenges affecting industrial parks during different phases of disruptions. The World Bank offers a four-phased process for achieving resilience in industrial parks, see Figure 2 (World Bank, 2020):

1) Understanding the range of disaster and climate change risks that can affect competitiveness.
2) Risk-informed planning of national strategies and prioritisation of investments and actions to mitigate and avoid impacts.
3) Disaster mitigation and preparedness actions through policy, infrastructure and finance-based approaches.
4) Response and recovery to facilitate rapid and sustainable return to build back competitive industries.

Figure 2: Resilience framework (World Bank, 2020)



Industrial resilience more broadly has been further elaborated on in a recent paper by Antonio Andreoni (2021), who recognises that countries have had differing responses to the COVID-19 pandemic, which has affected the resilience of their industries, among other things. He finds that those with poor responses – both general government capabilities and health responses – have had negative impacts on industry. The paper argues that there is a symbiotic relationship between improved government response and strengthened industrial capabilities, which in a mutually reinforcing way provides overall resilience. This analysis by Andreoni is important for South Africa and industrial park resilience as it recognises that it is beneficial for the government to support industry and industrial capabilities as it builds overall country resilience.

The paper provides a Resilience Capability Framework with three elements:

1) Resilience encompasses the entire industrial eco-systems, including both the public and private sector.
2) During times of crisis the different actors have separate roles to play, which changes at points in the crisis and require different capabilities from "resist, absorb, accommodate" to "adapt to, transform and recover".
3) Having resilience capabilities is a long term endeavour that requires finance, investment, development of capabilities, and the capacity to learn.

(Andreoni, 2021:6)

Andreoni does, however, note that having the funds to invest in building industrial capabilities and resilience is not easy for developing countries where resources are limited.

In a report for the United Kingdom's Department for International Development (DFID) by PwC (2018) on managing industrial parks in Africa, a key outcome is the importance of having a national strategy. While the report does not specifically look at resilience, the principle of having a national plan that incorporates how to approach and manage resilience in industrial parks is necessary and should be applied to such a strategy. This approach would form part of a value add for industrial

parks and the role of government in supporting industrial parks, both of which are core elements in recommendations by PwC on managing and implementing an industrial park strategy. A robust resilience framework would also form part of the offering by industrial parks and contribute to attracting investment into these spaces.

2.2. Benefits and aim for implementing resilience measures in Industrial Parks

Disasters or unprecedented events induce a halt in supply chains, reduce access to or destroy supporting infrastructure (i.e. ports, roads, power, water supply and sewerage), and can have economic impacts, such as low demand, recessions, or limiting access to finance, among others. Industry resilience in this context would contribute to firms and industrial parks' ability to minimise losses and damages, remain competitive through business continuity, and even grow in the face of such events.

The aim of implementing resilience measures would be to (World Bank, 2020):

- **Minimise disruptions** to business operations and "downtime" as a result of shocks. Business disruptions impact on profitability of firms and the ability to manufacture, trade or undertake services. For instance, with electricity or water disruptions, would the industrial park have measures to assist?
- **Continue or quickly resume** operations during and immediately after a disaster event or mandated closure (as was experienced during the COVID-19 lockdowns). For instance, during COVID-19 lockdowns, certain businesses were able to continue trading if they were specific industries and had the relevant permits. Not all businesses were able to access the permits or were unaware if the exemptions applied to them. Assisting industrial parks with information, support to navigate the regulations, and issuing relevant permits would have supported business continuity.
- **Support business sustainability and recovery** through assisting business with accessing the relief measures.
- **Provide broader economic, social, and environmental co-benefits** during normal times, which become even more needed during disaster events. For instance, encouraging public and private investments, networking among firms in the park to support each other, identifying economic opportunities including those that may arise as a result of the disaster (e.g. during the COVID-19 pandemic emergency medical and protective equipment was requirement).

Notably, proactive industry resilience planning and actions incur costs but generate competitiveness benefits by mitigating physical damage and avoiding business interruption and financial losses. Such measures would contribute to the businesses facing lower risks, being more sustainable and possibly improving their competitiveness. The economic benefits arising from industrial spaces that have embraced resilience measures could result in increasing their attractiveness to businesses which want to lower risks against future shocks that may occur.

3. MOTIVATION FOR RESILIENT INDUSTRIAL PARKS AND ECONOMIC ZONES IN SOUTH AFRICA

3.1. Institutional impediments

The benefits of industrial parks have been recognised by Parliament, particularly in providing substantial opportunities for creating employment in the region where they operate. The old apartheid-era industrial parks were noted by Parliament as mainly drawing in small to medium-sized enterprises in light and medium manufacturing, particularly textile, food and beverages, cleaning chemicals, and agro-processing.

Even so, these old industrial parks have been slow to produce meaningful employment and are generally plagued by several service challenges including frequent power and water outages, poor service delivery and the lack of security, which in turn leads to property invasions, vandalism and deterioration. The poor management of these industrial park was noted as a concern by Parliament, with high levels of tenant bad debt, and tenant exodus from these industrial parks. These challenges are particularly notable in Ekaindustria, Garankuwa and Babelegi located on the fringe of the City of Tshwane. For Parliament they exemplify the effects of poor governance and management on the effectiveness of industrial parks in promoting industrial activities.

Drawing on this review, industrial parks (including SEZs) in South Africa are confronted with the following constraints:

- Conflicted governance arrangements that result in park owners playing multiple roles, i.e. business support, rent collection, park management and sometime business lending.
- Poor management of operational aspects of parks.
- Lack of leadership from provincial departments despite the industrial parks falling under their custodianship. The concerns here are around inadequate development and management of parks, including the lack of financial support to industrial parks. The national government has been the sole funder of industrial parks and provincial and local governments have up until recently given little to no financial support.
- Poor rental collection impacts on the reinvestment in and maintenance of park infrastructure resulting in the exodus of tenants.
- Capacity constraint or a lack of operational and strategic staff. The shortage of experienced human capital has affected the ability of industrial parks to provide efficient service to their tenants.
- Lack of policy or uncertainty regarding policy. The SEZs benefit from comprehensive policy guidance, while traditional industrial parks do not benefit from any policy guidance.
- Poor community engagement strategies and a lack of social unity, resulting in frequent service delivery protests.
- Disruptions of electricity and water supply because of municipal unreliability.

(Parliament of the Republic of South Africa, 2022)

As a result of these challenges, implementation of policy objectives has been slow, leading to the less than satisfactory performance of industrial parks, the collapse of infrastructure in the traditional industrial parks, or low investments in the parks.

South Africa is not unique in this experience. Within other countries in Africa there has been has many examples of failed industrial parks. The cost-benefit of operating them has shown industrial

parks and SEZs to be unsustainable with a substantial cost to governments. It has often been the case that industries in industrial zones were not viable without protectionist policy and continuous state intervention. “SEZs in Southern Africa have had at best marginal success, with limited visible value add, and in many cases largely vacant sites. This outcome results primarily from the specifics of the economic structures and political economy of the region.” (Makgetla 2021:1)

Overcoming these structural constraints therefore requires an understanding of these constraints as well as the broader economic conditions that impact on the successful operations of industrial parks. The need for resilience under these circumstances becomes more pronounced.

From this review it highlights that South Africa needs to embed resilience principles and practices in industrial parks, which includes:

Enhancing competitiveness. To ensure the businesses in the park are viable needs appropriate support that both responds to the current economic climate in South Africa and to supporting competitiveness improvements in firms through a variety of interventions in their systems, technology and industrial processes. As noted by Andreoni, investment in the economic success of the businesses contributes to industrial resilience.

- Responding to institutional impediments. As can be seen from the Parliamentary processes there are institutional challenges and gaps that need to be addressed to strengthen support to firms in the industrial parks.
- Responding to the infrastructure gap. This, as noted, includes water, electricity, and access roads. It also requires broader infrastructure issues be addressed that may include strengthening rail access for firms in industrial parks, and beyond that into infrastructure that improves market access such as roads beyond the park.
- An approach or standard operating procedure that supports Industrial Parks and the firms in the industrial parks readiness to absorb and adapt to change in circumstance. These issues are further discussed in Report 3: *Industrial Park Standard Operating Procedures for Disaster Risks Reduction and Response.*

3.2 Increasing vulnerability to climate change induced shocks and infrastructure challenges

April 2022, two days of exceptionally heavy rainfall over the eastern cost of KwaZulu-Natal caused widespread flooding in the eThekwini Municipality. These floods took place after the city had only recently experienced severe weather conditions. The socioeconomic losses associated with this event were significant in the number of lives lost, casualties and damage to infrastructure. More than 40 000 people were impacted by the floods and 435 deaths were reported from the affected areas (South African Government, 2022). Some 13 500 homes were damaged or destroyed, 124 schools damaged and critical infrastructure comprising bridges, electricity, water and telecommunications networks was damaged, along with roads, including the N3 and N2 highways. Property damage was estimated at R17 billion. Analysis by an international consortium of climate scientists calculated that an event of this scale is predicted roughly every 20 years in today’s climate, moreover an event of this magnitude would have been rarer in a 1.2°C cooler world, with a return time of about 40 years (Pinto, et al. 2022).

Many natural and human factors contributed to the damage and loss of life from these recent floods. Nor were public authorities completely unprepared, as serious floods in 2019 prompted the eThekwini municipality to develop a climate action plan that included flood mitigation measures. However, only some of the required changes had been acted on in the time since it was drafted.

In this case, a legacy of racially based spatial planning, aged infrastructure, and absence of early warning systems contributed to the disaster. Such issues are not unique to eThekwini. They are mirrored in rapidly expanding cities around the world in which underlying socioeconomic differences are frequently reinforced through the built environment, concentrating poor and marginalised people in high-risk areas where they bear the brunt of disasters. These situations call for improved urban planning and better preparation for disasters or other shocks through pre-emptive action.

It is clear from this recent experience and the climate analysis coming out of it that anthropogenic atmospheric warming is causing a doubling of the chances of extreme weather events that can cause floods. One in a 100 year health pandemics are not the only shocks, and the likelihood is increased and different shocks will start to take place.

Case studies compiled by the World Bank suggest that natural hazards typically explain between 10% and 70% of disruptions to economies and communities, depending on the sector and the region. Infrastructure disruptions are a drag on people and economies. Put into an international context Hallegatte, Rentschler and Rozenberg (2019) observe, unsurprisingly, that infrastructure disruptions are generally closely linked to the level of economic development of the national economy and the poorest countries are hardest hit by inadequate infrastructure.

Firms experience multiple impacts from disrupted infrastructure through three channels. First are the direct impacts from the unavailability of essential inputs into production of power and water or services for transport and telecommunications. Second are coping costs to invest in self provision of power or investing in alternative water sources, from increasing inventory holdings or changing location to shorten transport distances. Third are indirect impacts which blunt competitiveness by imposing higher barriers to entry and lower investment, stunt innovation by suppressing new entrants, harm competitiveness in international markets, and prevent flexibility to produce on demand services and goods. Quantifying the impact on firms, the authors estimate that more than US$300 billion per year is attributable to infrastructure disruptions. Households are also negatively affected in many ways. These ranges from reduced ability to engage in productive, educational, and recreational activity because of power outages through to higher disease burdens that, even with limited data available, the authors estimate result in impacts of at least US$90 billion per year.

Technical solutions exist to build more resilient infrastructure through options such as using more robust material, laying down deeper foundations, building flood protection, elevating assets or adding redundant components. Such measures are costly, doubling or more the investment cost of infrastructure assets that necessitates infrastructure owners, almost always public authorities, being extremely selective as to where they focus measures to increase infrastructure resilience.

Hallegatte, Rentschler and Rozenberg (2019) make a case for targeted resilience investments. They analyse data on the spatial distribution of natural hazards, showing the benefits of a targeted approach to strengthening assets. In the scenarios they develop, the researchers make the case for the cost-effectiveness and benefit of building more resilient infrastructure. (Hallegatte, Rentschler, and Rozenberg 2019, 105-106).

Rather than examining infrastructure assets on their own, it is more useful to approach resilience from the perspective of infrastructure services because the cost of disruption exceeds the cost of repairs. Furthermore, this widens the locus of responsibility from public authorities and provides space for actions by users as industrial park management and tenants to influence infrastructure resilience.

Resilience can be increased by assigning a level of priority to assets based on the services they provide. As will be discussed further in the research findings this approach is already practised with power supplied to the East London Industrial Development Zone (ELIDZ), Nelson Mandela Bay Logistics Park (NMBLP) and Coega SEZ, as priority customers that are last in line to be loadshed despite not being critical loads in terms of the South African grid code such as hospitals and water treatment plants.

Further, network infrastructure services can be strengthened by diversifying assets to avoid reliance on a single point source and taking advantage of decentralisation made possible by the use of new technology. Implementing this approach is already taking place in industrial parks in South Africa through the installation of rooftop solar that can provide power in the event of a grid failure. Other measures such as rainwater harvesting and decentralise water treatment can contribute to more flexible hybrid water systems (Stip, et al. 2019). Similarly, these water resilience issues are being looked at in South Africa with the Atlantis SEZ planning water infrastructure that will aim for circularly use over the footprint of the industrial park (and is discussed further below). This approach is an example of combining infrastructure with nature-based solutions to reduce investment needs.

For many infrastructure services disrupted by shocks it is more cost-effective to replace the infrastructure after an event then to reinforce it to the extent that it is robust enough to resist any shock. No infrastructure asset or systems can be designed to cope with all possible hazards; moreover there is great uncertainty about the probability and intensity of most extreme events. For this reason, Randers (2012) and others argue that a strategy of “failing gracefully and recovering quickly” should be followed.

Infrastructure networks can be made more resilient by investing in strengthening assets and in improving network performance by building in redundancy and diversification. What matters most, however, is not the resilience of the supply infrastructure services but the resilience of the end users. Reducing demand for infrastructure services by improving efficiency as an important means to build resilience. Industrial park tenants surveyed for this report have in several instances implemented measures to reduce their water footprint through changing the way that water is used in their production processes, installing water-saving fixtures and rainwater harvesting systems. Similar changes have been made to electricity use through power factor correction, investment in more energy efficient plant and energy saving lighting.

Supply chain disruption experienced as a result of the COVID-19 pandemic were the most significant infrastructure related shock that firms surveyed for this report experienced, particularly auto industry firms that function as links in global supply chains. Coping mechanisms included those seen in other cases of supply chain disruption due to natural disasters – adjustments to capital, labour, inputs, technology and financial (Dormady, et al. 2017) requiring higher inventory holdings and changing logistics routes to get goods to functioning seaports. Firms, however, reported that reducing exposure to supply chain risks by localising suppliers was difficult to achieve.

Hallegatte, Rentschler, and Rozenberg (2019) argue that more resilient infrastructure could be achieved through a combination of measures they recommend. These are to get the basics right, to overcome political economy challenges and coordination failures through building institutions for resilience, designing regulations and incentives to encourage resilience, taking steps to acquire and supply data and knowledge tools to public and private actors for improved decision-making, and finally to ensure financing for resilience. The first point that speaks to the design operation and maintenance of infrastructure services resonate strongly with industrial park tenants that frequently have to content with service interruptions due to poor maintenance of water and power networks by municipal authorities.

4. FINDINGS FROM THE STAKEHOLDER ENGAGEMENTS ON LOCAL INDUSTRIAL PARK RESILIENCE

4.1. Methodology and overview of the parks interviewed

To better understand the direct impact of the COVID-19 pandemic, senior management of industrial parks were interviewed in December 2021, February and March 2022 to document their experience of responding to the pandemic. The period of interest was from the time that South Africa entered a state of disaster on 15 March 2020, through to the latter part of 2021. Semi-structured interviews were guided by a questionnaire in two parts, the first consisting of six questions that requested the respondents to detail how they responded to, managed, and recovered from, the COVID-19 shocks. They were requested to report weaknesses; detail obstacles to operations – from dependence on upstream suppliers and downstream customers; comment on whether things could have been done differently; and comment on the performance of local provincial and national government. The second part asked respondents to identify factors that would increase their industrial resilience; factors that would hinder resilience; and where they would expect to source knowledge about industrial resilience. The sections below cover the responses for each of category of questions.

INDUSTRIAL PARKS DESIGNATED AS SPECIAL ECONOMIC ZONES

Three out of the five industrial parks in the sample are designated special economic zones in terms of the Special Economic Zones Act No. 16 of 2014, namely Atlantis, Coega and East London.

The Nelson Mandela Bay Logistics Park is an industrial township on land owned by Nelson Mandela Bay metropolitan municipality which has signed a 50-year lease with Coega Development Corporation (CDC), renewable for the same period. Phuthaditjhaba industrial Park is situated in the town of Phuthaditjhaba in the eastern Free State.

The origin of each industrial park is different. Coega and East London Industrial Development Zone (IDZ) were established more than 20 years ago under the IDZ programme which aimed to establish export processing industries adjacent to an international port. The former involved the construction of the new deep-water port of Ngqura 20km northeast of the existing port of Port Elizabeth at Gqeberha.

Phuthaditjhaba Industrial Park was established in the 1970s under the then prevailing industrial policy of subsidising industries in what were called deconcentration zones located in bantustans or homelands. After 1994, with the first democratic administration, Phuthaditjhaba's industrial zones were transferred to the Free State Development Corporation (FDC). Phuthaditjhaba industrial Park, unlike the other parks assessed, does not have an on-site management body to manage its affairs. Instead, it is managed from the FDC in the provincial capital of Mangaung by a property manager who is also responsible for two other industrial parks in the province.

Atlantis, 66 km north of Cape Town, was established in the 1970s under similar conditions. Its industries have waxed and waned over time. In 2011 efforts were made by the City of Cape Town, Western Cape Province and the Department of Trade, Industry and Competition (the dtic) to encourage the establishment of green manufacturing companies in Atlantis. Ninety-four hectares have now been designated as a greenfield SEZ that is located within the broader Atlantis industrial area. At the time of the interview, Atlantis SEZ had five tenants, two of which were operating.

4.2. Stakeholder engagements with park management

4.2.1. First responses to the pandemic

After the announcement of a state of disaster on 15 March 2020, a hard lockdown was enforced from 26 March 2020. Initially it was for 21 days, to curb the spread of the coronavirus and included closing all international borders, shutting factories, shops, offices, construction sites, and schools. Legal powers to impose restrictions on movement and ban activities that could spread the disease were issued by government in terms of the Disaster Management Act No. 57 of 2002. Only activities classified as essential services, which included the distribution of foodstuffs, were permitted to continue operating.

Among the first steps that industrial parks took was to set up task teams to implement COVID–19 protocols for the protection of public health that were issued as regulations by government. These structures are summarised in Table 1. Regulations required businesses to appoint a COVID–19 compliance officer but the structures played a broader role, implementing business continuity and disseminating information about the regulations. It should be noted that at times the compliance officer was not one individual and more than one person played that role.

Table 1: Organisational structure responsible for COVID-19 response

INDUSTRIAL PARK	COVID-19 RESPONSE TEAM
Atlantis SEZ	All staff held daily Zoom meetings; later this practice continued with sub-groups meeting on specific tasks.
Coega Development Corporation SEZ	COVID-19 Task Team comprising Executive Manager: Operations, Executive Manager: Corporate Service (Human Resources), Head: Safety, Health, Environment and Quality, Head: Information and Communications Technology, Head: Communications and Marketing. Task team reported to the Chief Executive Officer.
East London IDZ	Business Continuity team comprising legal, maintenance, operations, communications staff set up run operations with switch to work from home.
Nelson Mandela Bay Logistics Park	Similar to Coega Development Corporation (CDC).
Phuthaditjhaba	Free State Development Corporation staff at head office.

At the start of nationwide lockdown, the CDC applied and obtained an Essential Services Certificate from the Companies and Intellectual Property Commission. This certificate was important for the businesses in the SEZ as there was lack of clarity in the regulations on what was required and who was eligible to be classified as essential. The certificates enabled CDC and its tenants to continue operating during the heavy national lockdown, including carrying out critical functions to plant and attending to maintenance related faults.

Another early problem to emerge was price gouging on personal protection equipment (PPE). The CDC was able to use its own health staff to advise what PPE was needed and decipher the confusing information in the media.

4.2.2. Working from home

All the park's management shifted to a work from home mode of operation in parallel to the changes in the government's "Adjusted Alert Level" which arose from the health risks related to the stage or wave of the pandemic, and determined under the Disaster Management Regulations. These working from home or office changes were required to continue operations and required measures

to ensure safety on-site. The Atlantis SEZ office quickly made this switch but for the CDC and the ELIDZ it look longer and involved a culture shift. Some new equipment had to be acquired and provisioned so that all staff had the necessary tools of the trade to carry out their jobs. Organisations had to find ways to respond to new issues from this operating mode, such as staff members who lived in homes with poor connectivity, without space in which they could work undisturbed or faced a high risk of theft of electronic equipment.

Organisations rapidly adjusted to the working from home and quickly began to reap its benefits. For the ELIDZ, the shift brought forward an existing information technology project to digitise the organisation so that all records were digitised, workflow and approvals done digitally and meetings held online. Cost savings from these changes came through removing the need for travel and accommodation spending on board members who live out of town, as well as eliminating the need for local travel for meetings at the provincial capital in Bisho. Over time, as the pandemic stretched into months, the working from home mode transitioned to a hybrid system with staff rotating into the office some days a week, except for people with who were at high risk of infection.

4.2.3. Rental and other support

After the initial flurry of mainly reactive responses, park management began to show some flexibility and initiative to develop a package of assistance for tenants and to address financial, human resources, logistics and community impacts.

CDC and ELIDZ developed a rental deferment policy for tenants which they took to their respective boards for approval. This policy was reviewed at intervals because at the start of the pandemic there was no certainty on the length of the lockdown nor how long the organisation would be required to extend rent relief, and what effects it would have on the finances of the SEZ. Economic assistance to tenants is shown in Table 2. At Coega most tenants were declared essential services so that they could operate, but this was not so for the large number of automobile-linked companies at ELIDZ and NMBLP. Subsidiaries of international companies followed policies and guidance from their head offices to access government grants, while park management focused on assisting locally based companies.

Table 2: Economic assistance to tenants

INDUSTRIAL PARK	ECONOMIC ASSISTANCE
Atlantis SEZ	None
Coega Development Corporation SEZ	Option for tenants to pay rent owed for lockdown period over six months. Assisted local firms to apply for government grants and the Temporary Employer-Employee Relief Scheme (TERS).
East London IDZ	Deferred rent due in lockdown period. Assisted investors to apply for TERS.
Nelson Mandela Bay Logistics Park	Followed similar measures as CDC.
Phuthaditjhaba	Wrote off interest on rent arrears for lockdown period. Helped tenants to apply for government grants and employment TERS grant.

4.2.4. Operating within the COVID-19 pandemic

When factories were restarted, attention was given to reducing exposure and requirement measures to avoid the spread of the COVID–19 virus among the workforce. Factors under the influence of the industrial park management included the system of movement into and from the parks, which needed to be controlled to avoid unnecessary exposure to the virus. The following

measures were implemented: changes were made to park security systems by removing turnstiles at entrances that required physical touching; separating entry and exit pathways; and putting down markings for social distance intervals on pavements.

Many companies regarded the public transport used by their staff as an infection hazard, so they hired taxis to transport their own staff to and from work. This was done on a company-by-company basis rather than park-wide where a co-ordinated response may have been more economical and efficient (with the benefit of hindsight). Reflecting on this action, it was observed that over much of the pandemic companies regarded external contact as a risk and turned inward, focusing on factors under their own control and avoided joint activities. The ELIDZ conducted a COVID-19 awareness campaign and supplied sanitiser material to taxi drivers that were engaged by companies in the park to transport staff.

CDC and ELIDZ both have clinics in the SEZs, which (once it was available) were turned over to running vaccination services in conjunction with the Department of Health when the national vaccine rollout programme began. This proved to be highly effective as the vaccination rate was 85% or above when the clinic operated at a factory, as workers could get vaccinated during working time.

4.2.5. Benefits of being in an Industrial Park

SEZ companies provide a lot more than landlord services to the investors. Over the course of the pandemic the benefits of being located in an industrial park with a dedicated management structure manifested in several ways, these included:

- **Efficient dissemination of information:** The SEZs disseminated information about the regulations to their tenants using email and instant messaging. This was important at the start of the pandemic when government regulations changed rapidly and were confusing with seemingly contradictory instructions being issued. CDC set up a user WhatsApp group with all the investors and it was exremely effective in disseminating information.
- **Access to government:** SEZs were able to easily access government to resolve issues and get access to information that was only available for general communication or highly congested helplines to firms outside of the parks. For example, the CEO of the ELIDZ was a member of the provincial Premier's COVID-19 task team and was thus able to elevate pertinent economic zone specific issues to the strategic platform for resolution and shared benefit.
- **Unblocking approvals**: SEZs worked to resolve issues obstructing their investors' ability to operate. East London IDZ's investors are strongly interlinked to the Mercedes-Benz assembly plant. At the beginning of 2020 Mercedes-Benz was working to introduce a new model which required expansion and retooling of its component suppliers located in the SEZ, with very strict timelines. The SEZ was able to obtain approval to continue construction activity on factories even in lockdown Level 4 when the rest of the construction industry was still suspended, on the grounds of these crucial deadlines. Another intervention they were able to make was to assist firms obtain travel approval for staff from international destinations to come into the country when travel was still restricted for many citizens, in order to commission machinery and start-up production plants.
- **Welfare of communities:** The Atlantis SEZ established a community forum from the time it was obtaining approval to be designated as an SEZ. This structure helped to build relations of trust with the community, and could be used effectively during COVID-19 as there was willingness by these communities to engage in the Atlantis SEZ programmes. For instance, during the hard lockdown the forum learnt of the problem of food insecurity in the surrounding community and the Atlantis SEZs was able to mobilise a soup kitchen to support the community. From an initial

reaction to deal with hunger, it has shifted into a food security programme linking food companies and community groups into a more sustainable economy endeavour for the broader Atlantis community.

- **Protection from loadshedding:** SEZs are priority customers and have good relations with the Metropolitan Municipality where they are situated. As priority customers the SEZs are the last to be loadshed, although they do not have binding agreements to that effect. No loadshedding has been imposed on any of the SEZs since Eskom started to experience supply shortfalls in 2008. The supply of utilities to industrial parks over the pandemic period is summarised in Table 3.

One of the outcomes of the successful response to the pandemic saw some large companies operating in an industrial township in Gqeberha called Perseverance (on the eastern side of the city) approaching the CDC with a request that it take over management of their industrial township because of the superior service that investors in the SEZ receive. In addition, CDC has developed an advisory business unit for the establishment of industrial parks in South Africa and West Africa.

Table 3: Supply of utilities in industrial parks

INDUSTRIAL PARK	UTILITIES
Atlantis SEZ	No interruption of services. Stopped load curtailment to keep critical loads energised. Close relationship with City of Cape Town Metro Municipality
Coega Development Corporation SEZ	No interruption of services. Priority customer for Nelson Mandela Bay Metro Municipality with open communication channels to resolve issues.
East London IDZ	No interruption of services. Reduced activity during lockdown and pandemic reduced demand for utilities. Priority customer for Buffalo City Metro Municipality.
Nelson Mandela Bay Logistics Park	No interruption of services. Similar to CDC.
Phuthaditjhaba	Disruption of services. Challenged municipality resulting in frequent and prolonged breakdown of utilities

4.2.6. Identifying weaknesses and areas for improvement

A summary of issues that could, with the benefit of hindsight, have been handled better by park management is set out in Table 4.

With the switch to working online, many partners in the Atlantis community need data to participate in activities, something that had not been included in approved budgets. Getting authorisation to switch budget items was also cumbersome.

CDC's assessment is that it was effective in handling requests, yet it did not initiate actions of its own. This has prompted CDC to revise the business continuity plans to take a more proactive stance to deal with future shocks.

ELIDZ expressed that there was lack of clarity about how to obtain special permits for automobile component manufacturers to bring in key personnel from overseas during the hard lockdown. This lack of clarity on many matters had wider applicability across the economy as organisations struggled at first to adjust to the COVID–19 regulations until they were cleared up. The SEZs also witnessed the logistics problems experienced by their tenants struggling with port closures and disrupted supply chains, but had no influence or remedies for these problems.

The FDC risk officer felt the organisation would be able to respond more effectively to a future pandemic or shocks based on the experiences with COVID-19.

Table 4: Areas of improvement to respond to unexpected shocks

INDUSTRIAL PARK	AREAS FOR IMPROVEMENT
Atlantis SEZ	As they were held back by a delayed decision to implement SEZ functions, it impacted on access to financial resources to manage the pandemic response. Rapid responses from decision-makers would be an important area for improvement.
Coega Development Corporation SEZ	Be more proactive to find out where park management could assist tenants. CDC was efficient in reacting to requests for assistance.
East London IDZ	Information and dissemination of information to firms on what was required and how to access government permits. This included knowing which part of government to approach for specific requirements, such as permits for international travel. Improved alignment with national initiatives and process. One of the firms in the park was part of the national ventilator programme to start manufacturing emergency medical equipment, however, the absence of rapid issuing of standards by government and placing orders meant that the firm was not able to participate in the initiative.
Nelson Mandela Bay Logistics Park	Similar areas to CDC.
Phuthaditjhaba	Improved financial resources in the park or an emergency fund would have been beneficial to firms in the industrial park, as the park lacked financial resilience to be able to offer rental deferment or financial support to tenants.

4.2.7. Measures to increase resilience

Steps taken by the industrial parks to increase resilience and those in preparation are set out in Table 5.

The Atlantis SEZ is positioning itself to be a green manufacturing park, attracting tenants that fit the profile of green manufacturing/circular economy and supporting this ambition with a physical infrastructure programme that has a positive ecological impact. These plans include designs for water use that does not exceed the rainfall catchment over the SEZ. Goals for the park are to be net zero carbon, net zero water, zero waste to landfill, and working with nature to preserve fynbos biodiversity so the operation of the park is hundred percent aligned to the Sustainable Development Goals (SDGs). Feasibility studies for embedded generation have been undertaken and the intention is to include this when capital is raised for the construction of top structures. In the short term, the plan is to explicitly market the Atlantis SEZ as a green industrial zone.

Two positive developments have come out of the COVID–19 pandemic for the Atlantis SEZ. First, it has an industrialist who is manufacturing green building materials from waste polystyrene, for which COVID-19 contributed to being able to negotiate obtaining waste materials from another industrialist at Atlantis to use in the building materials plant. The second innovation is one by the SEZ company itself, coming out of the working from home and online engagement experience. Here, the SEZ has developed methods for providing skills development to students via online training including the testing for traditional metal and machine trades.

The CDC has started to supplement electricity requirements with rooftop solar installations. Part of the head office buildings power needs are being met by a small solar array. As an ISO 14001 certified organisation, the CDC has started to prepare for ISO 5001 energy efficacy certification. Some of the existing factories are oriented in such a way that rooftop generation is not possible. All future buildings will be designed to be suitable for rooftop generation.

Water conservation is practised by rainwater harvesting and water-wise landscaping. In conjunction with the municipality, CDC is putting in boreholes and has the advantage of being close to the pipeline that brings in water from the Garip/Orange River scheme. Large projects that have been publicised, and would make a significant difference to Coega's energy status, include a proposal to manufacture green ammonia from renewable energy, however, these would take several years to materialise.

The main barriers for the CDC to increase resilience were seen as: resources, capital, obtaining the right partners for projects, and having the right regulations for SEZs. Being treated as an entity that belongs to provincial governments appears to stymie the ability of SEZs to fit into national industrial programmes and their accompanying budgets.

ELIDZ has performed a number of studies on options to reduce power and water consumption. No investments have yet been made; however, the following options are being explored. First, the SEZ is considering, in addition to rooftop solar generation, a 5MW solar plant on land within the park that is not suitable for siting factories. Second, one of the tenants is a fish farm with a pipeline to the sea for which the SEZ is considering the construction of a desalination plant. In the past the option of constructing a wastewater treatment plant was judged non-viable as the then available volumes were too low but this now needs to be revisited because economic growth in the area has increased the volume of water to be treated.

ELIDZ park management observed that a critical component of resilience is the economic health of the industries that operate within the park and that they were in discussion with the Industrial Development Corporation to improve its investor screening system to ensure effective support for distressed industries and firms wishing to locate or already located within parks. The SEZ is classified as a science park with several programmes for information technology and manufacturing technology incubation, with an emphasis on developing entrepreneurs to become second and third tier manufacturers for the automobile sector. These incubation programmes are explicitly designed to increase the resilience of the SEZ by fostering entrepreneurs who can respond to new market conditions and operate from the zone. Drawing on lessons from the disruption to supply chains wrought by the COVID-19 pandemic, ELIDZ has resolved to encourage localisation of production as much as possible to increase the resilience of the SEZ.

Phuthaditjhaba and ELIDZ are participating in the National Cleaner Production Centre of South Africa programme of government. This programme promotes the implementation of resource efficiency and cleaner production methodologies to assist industry to lower costs through reduced energy, water and materials usage, and waste management. Itis hosted by the Council for Scientific and Industrial Research (CSIR) on behalf of the dtic.

Table 5: SEZ plans to increase resilience

INDUSTRIAL PARK	PROPOSED PLANS TO INCREASE RESILIENCE
Atlantis SEZ	It is positioning itself as a green industrial park boasting green industries with net zero carbon, net zero water and zero waste to landfill. This focus will strengthen the marketability of the SEZ as well as contribute to more sustainable firms.
Coega Development Corporation SEZ	Has been working with the CSIR to implement ISO 5001 for all facilities, which will improve sustainability and strengthen access to new opportunities/markets. The SEZ is also planning 1MW rooftop solar as a pilot on five buildings to respond to electricity problems and will allow for ongoing operations during loadshedding. They are also addressing water-related issues through water-wise landscaping on all developments.

INDUSTRIAL PARK	PROPOSED PLANS TO INCREASE RESILIENCE
East London IDZ	Studies on rooftop solar and rainwater harvesting have been completed. This will see ELIDZ taking forward plans for a 5MW solar plant, rooftop generation and a possible desalination plant. The SEZ is classified as a science park, which allows it to host an incubator for entrepreneurs who are focused on the auto sector.
Nelson Mandela Bay Logistics Park	Rainwater harvesting infrastructure has been installed on the park management offices. A service provider has been appointed for the first phase of a 1MW rooftop generation plan.
Phuthaditjhaba	FDC is encouraging tenants in the park to participate in resource efficiency and a cleaner production programme. The park is part of the United Nations Industrial Development Organization Eco-Industrial Parks Programme.

4.3. Stakeholder engagements with Industrial Park tenants

4.3.1. Overview of findings

Industrial park tenants were interviewed in February 2022 using a modified questionnaire to that used for park management. Four of the six respondents are automobile component suppliers, therefore their experience of the shocks of the COVID–19 pandemic were multiplied by the disruption to the global auto industry because of the shortage of semiconductors that overshadowed the pandemic disruption. Two automotive suppliers declined to be interviewed noting that their sustainability during the pandemic was independent of the industrial park.

Dynamic Commodities bucked the business contraction trend because its products are sold to the at-home eating market, which did well through the pandemic as people were confined to their homes and treated themselves to little luxuries. All other companies experienced a significant downturn.

Referring to park management, tenants were appreciative of the work done such as providing information, obtaining permits to operate, applying COVID–19 health protocols effectively, securing the premises and parks (there was a noticeable increase in theft during the lockdown period), bringing clinics to workplaces to make vaccination easy, and efficiently maintaining park premises.

All companies applied COVID-19 protocols involving temperature checks, face masks, sanitisers. Faurecia in NMBLP was quite creative in applying a people traffic flow to its factory using wall and floor markings to direct people to move in certain ways around their plant to reduce contact and the risk of infection. Dynamic Commodities, which employs more than a thousand people, was regarded as a potential risk because of the high number of workers concentrated in the plant. Standard factory hygiene protocols involved swabs to test pathogens, work areas separated by ozone curtains and the factory has positive air so that air is always being displaced. These hygiene measures were very effective as no pathogens or bacteria were found.

4.3.2. Disrupted logistics

Disruption to supply chains resulting in more complex and more costly logistics management affected all companies, summarised in Table 6. The lockdown led to a breakdown in predictable port services which, accompanied by severe disruption of global shipping lines, led to scarcity and drove the cost of freight higher. Even more disruptive was the termination of reefer services to support the services of the Ngqura terminal, which required companies to have the reefer containers road hauled from Cape Town to Durban for export.

The supply chain disruptions severely impacted planning, requiring companies to make adjustments to their production schedules weekly and sometimes on a daily basis. Companies also had to increase their inventory levels, finance more working capital and adjust to longer lead times, enforced changes that one person quipped "from just in time to just in case".

"Unfortunately, the single biggest issue is the drop in sales and this chaos was caused globally, nothing the IDZ or anyone locally could have done better. We are surviving this relatively well, however, that is our own doing." – Plant Manager East London RG Brose Automotive Components

Table 6: Summary of COVID-19 impact on logistics

PARK TENANT	IMPACT ON LOGISTICS
Beijing International Automotive Corp SA (Coega SEZ or CSEZ)	Staff air travel cost from China have quadrupled. Shipping costs are high especially for containers.
Dynamic Commodities (CSEZ)	Reefer ships stopped docking at the port in Gqeberha so reefer containers had to be road hauled to Cape Town and Durban.
Faurecia (NMBLP)	Significant increase in the cost of sea and air freight as well as longer lead times.
QPlas (NMBLP)	Experienced higher freight costs and disruptions which necessitated switching to more costlier air freight to transport required inputs and parts needed for operations.
Rehau Polimers (NMBLP)	Increased inventory to avoid premium freight charges.
Voestalpine Automotive Components (ELIDZ)	Supply chains have been disrupted most significantly by the semiconductor shortage.

4.3.3. Reduction of resources footprint

Cost reduction became more important to match the reduction in business caused by the pandemic, however, most companies had been monitoring the utility usage and looking for ways to mitigate rising power and water costs for some time. Gqeberha has been experiencing a severe water shortage for several years, caused by failure to invest in water resources, exacerbated by a regional drought. Measures taken by companies to reduce their water and energy footprint are shown in Table 7.

International companies in Tier 1 automobile assemblers are driving changes to their suppliers to reduce Scope 3 carbon emissions. Both Faurecia and Voestalpine are the most carbon intensive subsidiaries in their respective company groups because of their use of Eskom electricity. Faurecia's parent company plans to be carbon neutral by 2030 and will soon impose carbon reduction targets on South African subsidiaries. Faurecia and QPlas operate large injection moulding machines with power needs that cannot be satisfied by embedded generation on their factory roofs. They are part of a pool of companies that supply Volkswagen which might in future obtain electricity from an Independent Power Producer (IPP) Volkswagen is considering.

Table 7: Summary of measures to reduce power and water consumption

PARK TENANT	RESOURCE FOOTPRINT
Beijing International Automotive Corp SA (CSEZ)	Factory is not in production yet.
Dynamic Commodities (CSEZ)	Uses large amounts of water. Carbon footprint is not a consumer issue yet.
Faurecia (NMBLP)	Rooftop solar not viable due to power needs. Recycles process water in closed-loop and uses flow reducers on taps.

PARK TENANT	RESOURCE FOOTPRINT
QPlas (NMBLP)	Rooftop solar not viable for power needs, would only cover lighting needs. Installed all power factor correction equipment possible. Installed rainwater harvesting for 180kL
Rehau Polimers (NMBLP)	Made plans for rooftop solar before COVID-19. Reduced water consumption from 40kL to 1.7kL per month by switching to waterless cleaning. Could be part of Volkswagen's IPP plans.
Voestalpine Automotive Components (ELIDZ)	Wishes to have embedded generation but unable to obtain wheeling rights or a viable feed in tariff from Buffalo City Metro.

4.3.4. Enhancing resilience

Strategies to enhance resilience are shown in Table 8. Three key messages come out of the stakeholder engagement with industrial park tenants. First, the disruption of supply chains has forced a shift for companies that are tied into the global automobile industry which was shown to be extremely brittle and ill-prepared to cope with shocks arising from the COVID-19 pandemic. Localisation of supply chains was identified as a desirable route to go but not without difficulties, in particular, sourcing competitively priced raw material inputs. Second, a key message is that cash flow is critical, and businesses need to be able to weather a complete interruption of sales when a high level of debt could push the company into insolvency. Third, paying attention to the needs of staff is critical so that morale and loyalty can be called upon when business conditions become tough.

Table 8: Summary of measures to enhance resilience

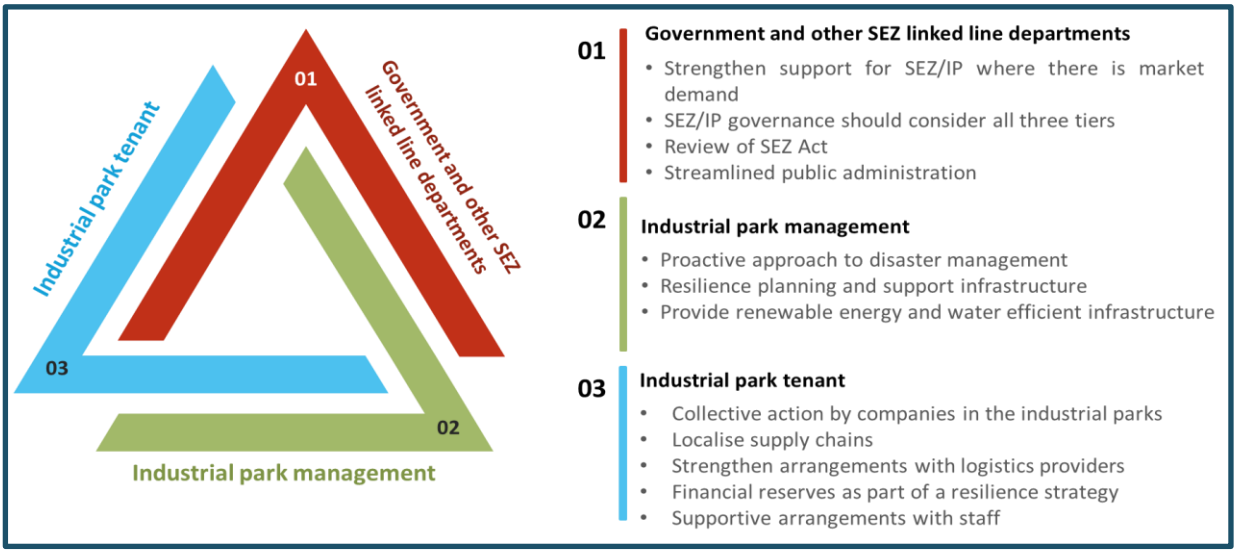
PARK TENANT	RESILIENCE MEASURES
Beijing International Automotive Corp SA (CSEZ)	No plans yet. Factory production planned to start at the end of 2022.
Dynamic Commodities (CSEZ)	Cash flow plus worker satisfaction makes a business resilient. The company can withstand any shocks if it has enough cash flow. If a company does not have workers satisfaction it will not be resilient.
Faurecia (NMBLP)	Supply of electricity is the key factor. Attempting to localise the supply chain to replace parts currently imported.
QPlas (NMBLP)	Paid staff throughout the lockdown, which put the company in good stead later on. Working to localise parts of supply chain to reduce vulnerability to supply chain disruptions
Rehau Polimers (NMBLP)	Resilient leadership with experience of Black Swan events[1] and high cash balances. Emphasise and take measures to keep work healthy.
Voestalpine Automotive Components (ELIDZ)	Embedded generation.

[1] A Black Swan is an unpredictable event that is beyond what is normally expected of a situation and has potentially severe consequences. Black Swan events are characterised by their extreme rarity, severe impact, and the widespread insistence they were obvious in hindsight.

5. RECOMMENDATIONS FOR INDUSTRIAL PARKS AND SPECIAL ECONOMIC ZONES ON COVID-19 AND FUTURE PANDEMIC RESILIENCE RESPONSE

Recommendations to enhance resilience have been divided into responses for three broad audiences: government (mainly but not exclusively the dtic, as the department responsible for managing the SEZs programme); park management; and the companies that are tenants in industrial parks. Figure 3 below provides a summary of the recommendations.

Figure 3: Summary of recommendations for resilience in industrial spaces.



Recommendations for government and other SEZ-linked line departments:

1. Establish or strengthen support for Industrial Parks in geographical areas where there is market demand and a strong likelihood of success. During the research it emerged that one of the successful industrial parks with potential for expansion has not been included in the SEZ programme and this limits its access to national government resources. The NMBLP is administered by the Coega SEZ as an implementing agent on behalf of the Nelson Mandela Bay Metropolitan Municipality. The park is in the fortunate position of having confirmed demand for additional factory space from existing tenants and other businesses attracted by the facilities offered along with its close proximity to important businesses such as the Volkswagen assembly plant. Due to the fact that the NMBLP is not an SEZ, it is not able to access funds for the SEZs programme to build new factory space. National government has limited the number of industrial parks designated as SEZs to avoid dilution of the programme, among other objectives. However, there are SEZs where there are low levels of investment.

This geographical approach poses the question of whether it is sensible to persevere with the SEZ programme as it currently stands over whether more jobs and investments would flow from directing the effort of the SEZs programme towards locations where there is a demand for expansion. Such changes should be pursed even if they contribute to concentrating growth in cities/regions that are actually attracting investment rather than proceeding with the programme by designating SEZs in provinces where location and agglomeration economics rule out the possibility of successful takeoff. Evidence from this research suggests that industrial parks should be expanded where there is confirmed demand even if that requires an overhaul of existing regulations to respond to industrial property market forces.

2. **Governance of SEZs should take into account the municipality in which it is located as well as provincial and national government**. The experience of the COVID–19 shocks has demonstrated the

importance of close relations between industrial parks and the municipalities within which they are situated to respond to problems and provide uninterrupted utility services to tenants. The research has documented practical arrangements that industrial parks have made to strengthen relations between themselves and municipalities through memoranda of understanding, however, these have taken place due to informal associations by individuals rather than formal governance links. A second important link to government is a connection to national industrial policy programmes. This would require closer links to the dtic so that they can both access resources and be sites for the implementation of industrialisation programmes. In order to strengthen important links to municipal government and to national government, it is recommended that the governance structure of industrial parks be revised to combine representation and formal relations to the three tiers of government: municipal, provincial and national.

3. **A review of the Special Economic Zones Act**. The need for a legislative review was raised by stakeholders that argued the Act should be reformed. First is an overhaul of the administrative procedures required for the establishment and designation of SEZs, including the governance structure. Second, a hard look at the distinction between the characteristics and regulations within SEZs and those prevailing for the rest of the economy. There are lessons that can be learnt from the SEZ incentives that could be applicable to broader economic incentives. It is therefore recommended that consideration be given to a review of the SEZs Act. The review should consider the experience accumulated since its passage in 2016 and the learnings from responding to current challenges and shocks such as the COVID-19 pandemic. In addition, the review should consider emerging trends such as climate change and integrate resilience approaches as gleaned from this research.

4. **Streamlined public administration.** Instances of slowness due to bureaucratic processes that frustrated more agile responses were recorded. Weighing the need for faster responses against the relaxation of public finance management controls in a public health crisis in South Africa does not provide an unambiguous recommendation. Noting the egregious abuse of public funds for some of the procurement that took place at the start of the pandemic, it would be reckless to recommend reducing public finance controls, yet the lack of agility impacts negatively on industrial park resilience. Faster approval processes and more streamlined public administration is the answer, therefore a key lesson from the COVID-19 shocks is that the time to work on strengthening systems is during the intervals between shocks in order to be better prepared when they occur.

Recommendations for Industrial Park management:

5. Proactive approach by park management to disaster management. COVID–19 tested the resilience of all stakeholders and, as this research has documented, park management was successful in protecting the health of staff, attending to tenants' problems and assisting firms to resume business as soon as possible. Self-criticism revealed that park management could have been more proactive than they were, and therefore a new approach needs to be taken to business continuity planning. This need so cover a wider range of potential disruptions in shocks and taking a customer-centric view of how to protect lives and property along with helping businesses to resume operations as early as possible.

6. **Resilience planning and support infrastructure to attract firms to industrial parks.** The research documented the numerous benefits that firms located in SEZs enjoyed. These are important differentiating features with which to attract new investments and therefore it is recommended that park management highlight the resilience of utilities and services they are adding to in the way that they market their locations.

7. **Provide renewable energy and water efficient infrastructure**. South Africa is confronted with two main factors which affect the competitiveness and optimal operation of industrial parks, namely energy insecurity and vulnerability to climate extremes which affect security of water supply. Owing

to this, it is important for park managers to urgently respond to the twin challenges by investing in a suite of interventions which include infrastructure improvements, human resources and technological innovations. Factory design and orientation for new factories, in the case of CDC for example, will take into account rooftop solar generation, water efficiency and rainwater harvesting. It is recommended that such design aspects involve tenants to enable them to reach corporate targets for reducing their resource footprint and carbon impact.

Recommendations for Industrial Park tenants:

8. **Collective action by companies in the industrial parks**. Companies acted in silos in planning and implementing measures to reduce infection risks to staff by, for example, laying on staff transport. It is recommended that industrial park tenants discuss the feasibility of joint action, as it may be more economical and/or safer in scenario planning for potential shocks in future. Partnerships among park tenants can also be a crucial bedrock for exchange of information and lesson learning, including industrial symbiosis which presents both economic and environmental benefits for companies. Importantly, promoting partnerships and joint action to tackle industrial needs to be supported through enabling structures and neutral platforms which encourage transparency alongside mutually beneficial outcomes.

9. **Localise supply chains.** The inherent vulnerability of long, complex global supply chains was exposed by the COVID-19 pandemic and improving their resilience calls for several changes, most notably increasing inventory levels and localising sources of supply. Both of these approaches were applied by firms. While increasing inventory provides buffers for interrupted supplies, a more resilient approach, where possible, is to localise suppliers. Successfully on-shoring supply chains is demanding and requires shifting dependencies to firms that must meet quality price and delivery thresholds. Building relationships with upstream suppliers should be a priority for firms intent on reducing their vulnerability to supply chain disruption.

10. **Strengthen arrangements with logistics providers**. Logistics interruptions mainly related to intermittent shipping services particularly affected firms in East London and Gqeberha. A large part of the disruption was caused by shipping lines dropping their scheduled calls to Eastern Cape ports, which is outside the control of SEZ tenants. Logistics disruptions caused by breakdowns in Transnet operations, however, could be remedied by higher standards in service agreements with logistics companies. Practical steps include engagement with Transnet and other logistics providers on scheduling arrangements, working with other industrial parks to group input materials (where appropriate), and active measures to identify local sources of supply.

11. **Financial reserves as part of a resilience strategy.** Companies that faired best through the COVID-19 shocks were those with the financial reserves to cope with being shut down for a period. Cash reserves are the most valuable part of a company's resources to deal with shocks that can take many forms. Whenever possible, firms should deleverage and build up cash reserves to increase their resilience. The strengthening of financial responses to enhance resilience of a park tenant also involves companies actively seeking insurance services which cover disasters that companies may be potentially vulnerable to. When companies do not have financial reserves, it is important for them to be conversant on where they can secure capital for running costs or recovery in time of disaster. Such knowledge provides a measure of stability and certainty.

Supportive arrangements with staff. The capacity of staff to cope with business interruption, risks of lost income and adjusting to new operating procedures as a critical component of a firm's ability to cope with shocks. Evidence from the research shows that those firms that took steps to preserve the income of their staff through business disruptions were able to rely on staff to be more flexible about adjusting to work patterns caused by the COVID–19 shocks, and the conclusion that measures to maintain staff morale are an important part of a firm's resilience.

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