



# Analysing the impact of COVID-19 trade disruptions on port authority pricing and container shipping in South Africa



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## Dates:

Received: 29 Mar. 2022

Accepted: 17 May 2022

Published: 31 Aug. 2022

## How to cite this article:

Grater, S. & Chasomeris, M.G., 2022, 'Analysing the impact of COVID-19 trade disruptions on port authority pricing and container shipping in South Africa', *Journal of Transport and Supply Chain Management* 16(0), a772. <https://doi.org/10.4102/jtscm.v16i0.772>

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**Background:** The coronavirus disease 2019 (COVID-19) pandemic directly affected the shipping industry globally, and South Africa experienced decreased cargo volumes and increased freight rates. In addition, National Ports Authority (NPA) charges are 69% and cargo dues 166% above the global benchmark mean. The NPA uses a rate of return (RR) model to calculate tariff increases that are contested by port stakeholders.

**Objectives:** The study aimed to analyse the impact of COVID-19 trade disruptions and examine the associated higher liner freight rates, tariff applications for higher NPA tariffs and reduced investment in port infrastructure. It showed that adjusting the RR model variables can result in reduced tariffs and large cost savings for port users.

**Method:** This study analysed the impact of the pandemic on South Africa's cargo volumes and freight rates. It critiqued the regulatory asset base, the asset beta, and the tax rate to be applied and calculated the adjustments to these RR model variables using five scenarios for FY2022/2023.

**Results:** The results show a sharp decrease in cargo volumes during COVID-19 lockdowns, and a parallel increase in freight rates. The five-scenario results show how the NPA tariffs could be much lower, calculating a tariff decrease of 5.7% in scenario 4 and a 20% decrease in scenario 5.

**Conclusion:** Amid the global rise of shipping rates and the economic impact of the pandemic on South Africa's trade, the results show that there is a potential to enhance South Africa's trade competitiveness through a decrease in NPA-weighted average tariff by 20%.

**Keywords:** COVID-19; port pricing; port authority; Ports Regulator of South Africa; shipping; South Africa.

## Introduction

The coronavirus disease 2019 (COVID-19) pandemic has created fundamental challenges for the global economy. Global Gross Domestic Product (GDP) showed a severe decline in 2020, which was especially felt by developed economies (United Nations 2020). The World Bank (2022) predicts global economic growth to decelerate to 4.1% in 2022, reflecting continued COVID-19 flare-ups, reduced fiscal support and continuous supply bottlenecks. Emerging economies are experiencing weaker recoveries as a result of slow vaccination progress and limited policy responses.

Global trade also decreased significantly and foreign direct investment (FDI) followed suit. As a result, the situation highlighted severe vulnerabilities in global supply chains, many of which were not prepared for the unexpected disruptions (Veselovská 2020).

Supply chains are sensitive to high-impact events, which can cause various levels of decline in consumption, trade and transportation (Notteboom, Pallis & Rodrigue 2021). Consumption patterns during such events are affected by a loss of spending capacity by consumers, which in turn causes firms to experience a decline in demand and a parallel reduction in inventory levels. Bottlenecks through supply chains globally have led to a surge in order backlogs and record-high shipping prices (World Bank 2022). Significant production problems occurred in most Asian countries and were amplified as other regions struggled to acquire sufficient industrial inputs for manufacturing (Baldwin & Freeman 2020).

**Note:** Special Collection: Impact of COVID-19 on the transport and logistics management.

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These events caused unprecedented impacts on the port and shipping industries specifically (Notteboom et al. 2021). Global supply chains are underpinned by maritime transport, with shipping estimated to handle over 80% of global goods trade (UNCTAD 2021a). Developing countries are heavily dependent on maritime transport for access to global markets. In the first 24 weeks of 2020 alone, global ship calls declined by 8.7% and when countries started to impose economic and social restrictions, the number of ship calls fell by up to 20%.

For South Africa the impact was equally devastating, and it was exacerbated by a set of other events before and after the COVID-19 pandemic outbreak. Before the pandemic, South Africa already found itself in an economic recession and increasing unemployment levels (Makokera & Makokera 2020). The World Bank Global Economic Prospects report (World Bank 2022) estimated a GDP growth rate of 4.6% for South Africa during 2021 and a forecasted growth rate of only 2.1% in 2022. Persistent unemployment, inequality, rising government debt and structural impediments to growth are predicted to continue having a significant impact on the country's recovery.

During COVID-19, the shipping industries in South Africa were hit equally hard. The UNCTAD (2021a) reported that the ship calls to port in 2020 declined by 9.7% in sub-Saharan Africa. For the Port of Durban, a 6.6% drop in ship carrying capacity in the first quarter of 2020 was reported, and in the second quarter, the port lost 5% of liner shipping services, 6.2% of ship calls and 2.8% of the deployed capacity.

South Africa then also faced other significant events. The World Bank (2021) ranked the South African ports in the bottom five of the world's 351 competent container handling facilities in 2021. The Port of Durban was ranked position 349, Ngqura ranked at position 351, Port Elizabeth ranked at position 348 and Cape Town ranked at position 347. This ranking reflects poor port performance and productivity, which puts into question the ability of South Africa's ports to remain competitive, especially with the additional pressures of the COVID-19 pandemic.

The National Ports Authority (NPA) is the single landlord for South Africa's eight commercial ports. The NPA provides the port infrastructure and marine services. The NPA is regulated by the Ports Regulator of South Africa (PRSA). The NPA is a division within Transnet SOC Ltd., a state-owned logistics company. The *NPA Act 2005* stated that the NPA should be incorporated as a subsidiary of Transnet, nevertheless, the NPA remains a division of Transnet.

Other contentious issues surrounding port pricing and a lack of infrastructure investments also occurred (Meyiwa & Chasomeris 2020). Chasomeris and Gumede (2022) observed that the NPA annual profit before tax increased 155% from R2.9 billion in 2017 to more than R7.4bn in 2019. Over the same period, the PRSA granted an increase in planned capital expenditure (investment) from R4.1bn to R5.4bn. Actual

capital expenditure, however, declined 55% from just over R2bn to R905 million. In 2019–2020 there was some increase in actual spend to R1.598bn. However, the impact of COVID-19 may partly be seen in the significant decline in investment spending to R684m in 2020–2021. The TNPA (2021) explained that this reduced investment was largely because of the COVID-19 pandemic and the impact of the lockdowns on economic activity.

South Africa was further affected by extreme riots in KwaZulu-Natal province in July 2021 and cyberattacks on Transnet in the same period where the Transnet information technology system was hacked (Smith 2021). These events further exposed the vulnerability of South Africa's ports.

This study aims to analyse the impact of COVID-19 trade disruptions and shows the adverse effects of the pandemic, including higher liner freight rates, tariff applications for higher NPA tariffs and reduced CAPEX investment in port infrastructure by the NPA.

The PRSA, 2021a benchmarking study shows that South Africa's port authority charges are 69% above the global benchmarked mean and that cargo dues are 166% above the mean. The NPA and PRSA use a rate of return model, known as the revenue required (RR) model, to calculate annual revenues and the annual port authority tariff adjustments. The values of several components of the RR model applied by the NPA are contested by port users and stakeholders (Chasomeris 2015; Gumede & Chasomeris 2017; Meyiwa & Chasomeris 2020). This study calculates evidence-based adjustments to the RR model variables and shows the results under five distinct scenarios. Such results will show that there is a potential to reduce NPA weighted average tariffs by as much as 20%.

## Global impact of COVID-19 on the ports and shipping industry

Ferry services and the cruise industry were the two shipping industries that were impacted the most by the pandemic because they are most closely linked to personal mobility and cross-border movements, especially in the European Union (EU) region (Cullinane & Haralambides 2021). However, the most immediate impact of the pandemic was seen in global container freight rate trends.

The previous high-impact event, the 2008/2009 financial crisis, also had a direct impact on the profitability of the liner shipping market, causing many carriers to opt for bail-outs or debt restructuring plans (Notteboom et al. 2021). The shipping industry was unable to adjust vessel capacity, which resulted in a period of depressed freight rates, mostly because of poor capacity management and the lack of rationalisation in the industry.

However, the COVID-19 pandemic showed different results, as container lines adjusted their strategy to cope with the drop in volumes, which meant that freight rates did not

depress as in the previous incident. In fact, most global freight rates reached a record high during the end of 2020.

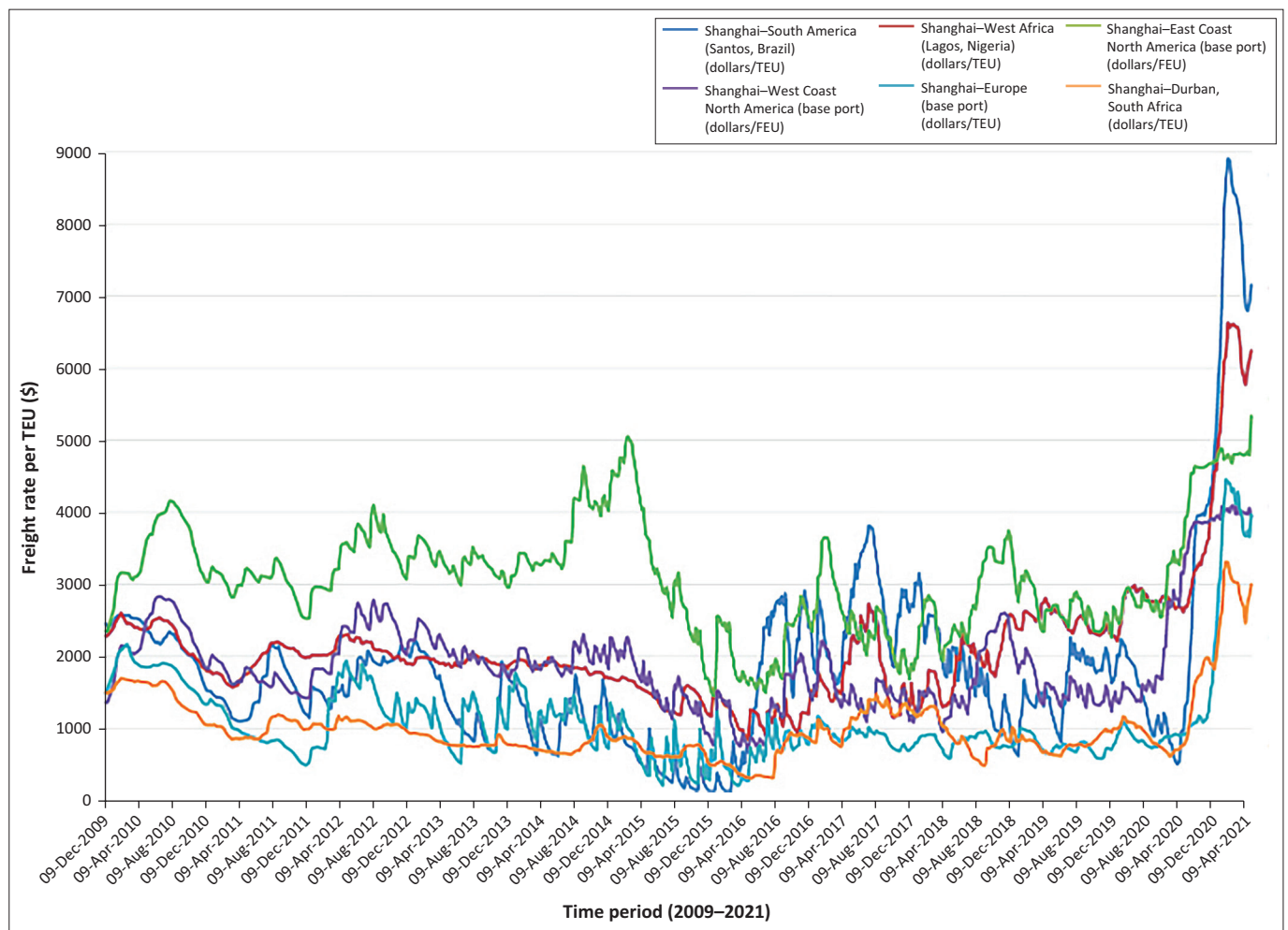
Figure 1 shows the drastic increase in container freight rates from August 2020 onwards on the different Shanghai shipping routes (UNCTAD 2021b). The highest impact was seen in the Shanghai to South America and West Africa trade lanes. Data from Drewry (2021) indicated that from May to September 2021 the East-West container freight rates (\$/40 ft) continued to increase drastically to over \$10000 per container. Not only was the surge in freight rates directly linked to the COVID-19 pandemic but the blocked traffic in the Suez Canal during March 2021 triggered a new surge in container spot freight rates. The ripple effect was passed on directly to the final consumer as most companies cannot absorb the increased freight rates (UNCTAD 2021b).

The reasons for the extreme surge in freight rates are varied. Firstly, the changes in consumption patterns caused a spike in electronic commerce, which raised demand for manufactured consumer products. Maritime trade then surged even more as some governments relaxed lockdown

regulations and the increase in demand was larger than predicted, resulting in a shortfall of empty containers because of a lack of shipping capacity (UNCTAD 2021b). Empty containers were left in locations where they were not needed, and repositioning was not planned for. Many containers were “trapped” on South American and African routes because of the long trips involved and there was an equivalent shortage of freight return from these places.

Hoffman (2021) further attributed the spike in container freight rates to slower-than-normal container turnaround times in ports and equally slower transport linkages. He also indicated that supply capacity was not increasing fast enough to keep up with demand, and ports’ flexibility is limited compared with shipping lines.

Additional challenges were caused by the decrease in the number of global port calls (Notteboom et al. 2021). Container vessel calls at ports throughout the world fell by 3.6% in the first 30 weeks of 2020 compared with the same time in 2019. The variation in port call reductions can also be seen at the port level. Since COVID-19 was declared a pandemic in mid-



Source: UNCTAD, 2021a, 'COVID-19 and maritime transport: Impact and responses', Transport and trade facilitation, series 15, viewed from [https://unctad.org/system/files/official-document/dtltb2021d1\\_en.pdf](https://unctad.org/system/files/official-document/dtltb2021d1_en.pdf); UNCTAD, 2021b, *Shipping during COVID-19: Why container freight rates have surged*, viewed 23 August 2021, from <https://unctad.org/news/shipping-during-covid-19-why-container-freight-rates-have-surged>

FEU, 40-foot equivalents unit; TEU, 20-foot equivalent unit.

**FIGURE 1:** Shanghai containerised freight index, weekly spot rates, 18 December 2009 – 09 April 2021.

March 2020 through July 2020, the percentage of container ports that had a lower number of calls each week approached 40%. A series of blank sailings in long-haul liner services, which can serve as a signal of demand changes, contributed to the documented fall in container vessel calls.

Cullinane and Haralambides (2021) stated that this pandemic was caused by an unforeseen external shock and it is therefore expected that the world economy will return to pre-COVID-19 levels of activity and might even surpass them. However, slow economic recovery and continuous reorganisation of global supply chains, according to Notteboom et al. (2021), could encourage shipping lines to rationalise the main East-West routes and develop regional shipping networks in the long run.

## The impact on the ports and shipping industry in South Africa

President Cyril Ramaphosa proclaimed a national state of disaster in South Africa on 15 March 2020 and announced immediate measures to curb the spread of the virus. By 20 April 2020, two of South Africa's eight seaports (Saldanha Bay and Mossel Bay) were closed to passenger traffic and crew disembarking (Oyenuga 2021).

The initial closure of international borders for all but the most essential items resulted in a contraction of the economy and the circulation of goods. As a result of movement limitations, trade with South Africa initially declined by 3% and many shipments were left stranded in ports, yards and warehouses (Bezuidenhout 2020; Viljoen 2020).

Eventually, commercial ports were reopened and by September 2020 services in ports slowly returned to pre-COVID levels (Pike 2020). But the effects are far from over. Increased port tariff charges and continued high international freight rates have had a significant effect on the industry. The next section analyses the trends in cargo volumes and rates in more detail.

## Trends in cargo volumes and container freight rates in South Africa

During the initial phases of lockdown, port operations were scaled back to 60% capacity because of the further drop in imports and exports and Transnet Freight Rail declared an immediate scale-down of operations (Luke 2020). The effects remained significant even after the initial hard lockdown in April 2020. Figure 2 provides an overview of the total cargo volumes and the total 6 million containers Twenty-foot equivalent units (TEUs) handled by the different ports in South Africa from January 2019 to August 2021 (Transnet 2021). The data show the most severe impact of COVID-19 lockdown on cargo flows from April 2020 until July 2020, which corresponds with the time period in which South Africa had its most severe lockdown restrictions in place.

Further data obtained with permission from a local South African freight forwarding company indicate the average 40-ft container freight rates for goods imported through Durban port from 2020 to 2021. Figure 3 shows the drastic impact of the COVID-19 pandemic on container freight rates that this specific company experienced from July 2020, especially for imports from China. Container freight rates almost doubled for goods imported from Italy and for goods imported from China the container freight rates jumped from R15 395 in July 2020 to just over R60 000 in June 2021.

Venter (2021) reported that the spot rate for a 40-ft container from Shanghai to Los Angeles in August 2021 was 238% higher than during the same period in 2020, reflecting a seriously imbalanced system. As a result of international container delays and capacity issues, shipping lines reduced the capacity of South Africa's trade route, shutting down services and phasing out large vessels to small vessels. Shipping lines also diverted goods destined for the port of Durban, to the ports of Ngqura or Cape Town or even opted to unload goods at neighbouring Walvis Bay, Luanda or Maputo ports. Venter (2021) emphasised that the inefficiencies at the port of Durban hindered shipping lines' ability to restore the reliability of their schedules.

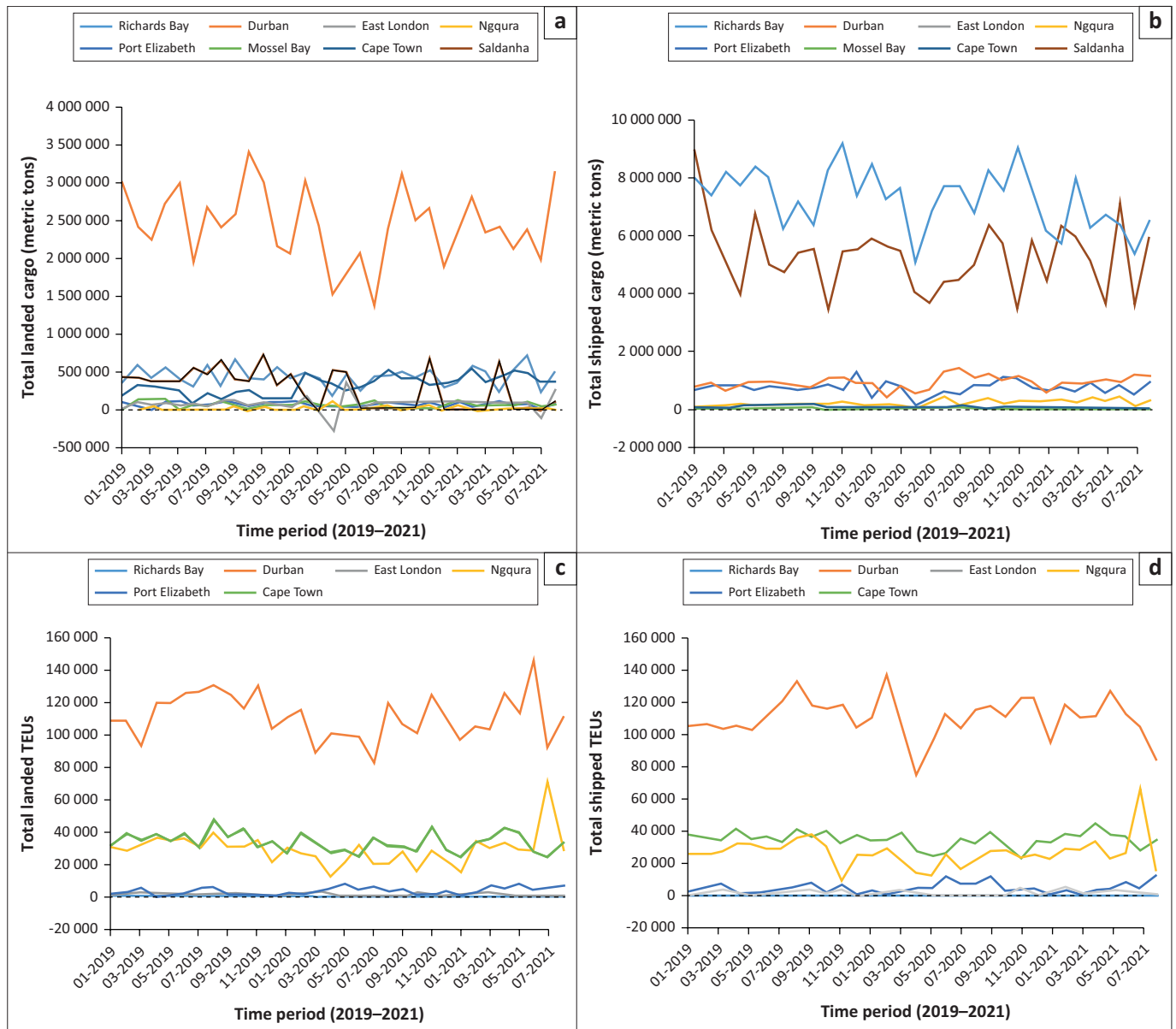
Accessibility into the port of Durban itself has also experienced significant delays, with extended time periods of waiting for trucks entering the port. Poor access routes and underdeveloped rail infrastructure cause further problems (Venter 2021).

The following section discusses the issues surrounding port pricing that has also exacerbated the situation.

## Port pricing in South Africa

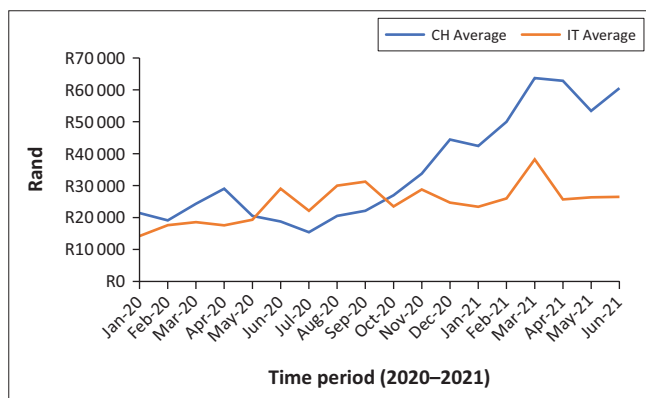
The PRSA (2021) annually publishes a Global Pricing Comparator Study for Port Tariffs. It is a benchmarking study with a selection of 25 container ports that compares cargo dues, terminal handling charges and marine services. The benchmarking exercise used a standardised container vessel to calculate vessel calling costs on 01 April 2020. It assumes an average turnaround time of 32 h and a parcel size of 1853 TEUs (a combination of full and empty for deep sea, coastwise and transshipment). The study is useful in monitoring and shaping expectations about the trajectory of port authority pricing in South Africa. Of the total cost to move a TEU through a South African port, terminal handling charges contribute 66%, cargo dues contribute 29% and marine charges contribute 5% (PRSA 2021). The PRSA (2021) showed that South Africa's marine charges are 44% below the benchmarked sample average. In stark contrast, terminal handling charges are 55% above the average and cargo dues are 166% above the average. Total port authority pricing, which includes marine services and cargo dues, is 69% above the sample average. The PRSA only regulates the NPA and not Transnet Port Terminals. Therefore, only the NPA charges are under price regulation.





Source: Transnet, 2021, *Port statistics*, viewed 23 August 2021, from <https://www.transnetnationalportsauthority.net/Commercial%20and%20Marketing/Pages/Port-Statistics.aspx>

**FIGURE 2:** Total cargo (in metric tons) and total Twenty-foot equivalent unit (TEU) flows through South Africa's ports.



**FIGURE 3:** Average 40-ft container freight rates for imports from China and Italy to Durban: 2020–2021.

The total vessel calling costs (including marine charges, cargo dues and terminal handling charges for containers) decreased from 360% above the benchmarked average in

2012/2013 to 65% above the average in 2020/2021. Despite the reduction, overall port charges are higher than the average and:

[R]emain excessive ... indicating that the South African container ports (Durban and Cape Town) remain amongst the most expensive against the sample despite the sizable reduction in container cargo dues in recent years. (PRSA 2021:19)

In terms of cargo dues, compared with the benchmarked sample average tariff of \$32 7835, South Africa's ports ranked as 166% more expensive than this average. The PRSA (2021) explained that:

[T]his is an improvement to the 2019 deviation of 233% and a significant improvement to the 2012 tariff where cargo dues were 874% higher than the global sample average. At full implementation of the Tariff Strategy, the cost reflective tariff for containers (as denoted by the Durban target tariff) will be 36% below the global sample average, in today's terms. (p. 15)

Gumede and Chasomeris (2018) showed that the reason for such excessively high cargo dues was largely because of the legacy of *ad valorem* wharfage that was abolished in 2002, but continues to affect the tariff structure. Consequently, there is still cross-subsidisation between commodities where automotive and containers appear to cross-subsidise bulk and breakbulk cargo handling. In addition, there is cross-subsidisation between user groups where cargo owners appear to cross-subsidise port tenants and shipping lines (Gumede & Chasomeris 2018).

So clearly, there is a desire and a need to reduce port authority charges, in particular cargo dues that are still 166% above the benchmarked mean, and a need to implement a tariff strategy that continues to work towards the PRSA goal of cargo dues that are 36% below the benchmarked average. This article uses evidence-based adjustments to RR model variable assumptions and shows (calculates) how the NPA cargo dues can and should be further reduced.

## Background to the revenue required methodology

The NPA and PRSA have agreed to use a rate of return methodology referred to as the revenue required (RR) model. Annually, there is a tariff adjustment application by the NPA to the PRSA. Since 2009–2010, the PRSA invites port users and other interested parties such as industry representatives, government departments and academia to provide comments on the tariff applications. The PRSA performs its own analyses and research, considers the application and comments and then decides on what tariff (price) adjustments should be allowed for the following financial year starting in April.

In South Africa, the South African Reserve Bank uses inflation targeting and aims to keep inflation as measured by the consumer price index (CPI) between 3% and 6%. The PRSA aims to keep NPA price increases below the upper band of 6%. In most years PRSA has been able to use the RR model to ensure weighted average tariff adjustments that are below 6%.

The formula for the RR, as per the Port Tariff Methodology of the Ports Regulator for Tariff Years 2018/2019 – 2020/2021 (Ports Regulator of South Africa 2017:7), is as follows:

$$RR = (v - d + w) r + D + E + T \pm C \pm ETIMC \pm WEGO \quad [\text{Eqn 1}]$$

where *RR* = revenue required; *v* = value of the assets used in the regulated services; *d* = accumulated depreciation on such assets; *w* = working capital; *r* = regulated return on capital; *D* = depreciation accounted for in the period of the tariff; *E* = operating costs (OPEX); *T* = taxation expense; *C* = claw-back; *ETIMC* = excessive tariff increase margin credit; *WEGO* = weighted efficiency gains from operations;  $(v - d + w)$  = regulated asset base (Fakir & Chasomeris 2019).

Chasomeris (2015), Gumede and Chasomeris (2017) and Meyiwa and Chasomeris (2020) provided a detailed discussion and critique of the RR model. In particular, the values of several components of the RR model applied by the

NPA and PRSA are contested by port users and stakeholders. There are four variables that this study will focus on, namely, the regulatory asset base (RAB), the asset beta, the tax rate to be applied and the ETIMC.

Firstly, there should be a reduction in the RAB by R29bn and, in order to ensure the sustainability of the NPA, this reduction may need to be phased, perhaps over 2 or 3 years. Meyiwa and Chasomeris (2020) explained that there was an approved revaluation of the RAB, using a financial capital maintenance approach, based on historic cost and trended original cost. The NPA estimated that the PRSA Valuation of Assets would reduce the NPA's opening RAB value at 01 April 2019 by approximately R45bn from R83.5bn to R38.1bn. For the financial year (FY) 2018/2019, a change in the valuation of assets methodology resulted in a R15.8bn reduction in the RAB. So, what happened to the R29.2bn difference? It appears that there is still scope for RAB value reductions (Chasomeris 2020). Secondly, the use of an equitable tax rate of 15.5% should be used as long as the NPA remains a division of Transnet (Fakir & Chasomeris 2019). Over the period 2011–2017, the PRSA allowed the use of the pass-through of corporate tax rate (28%). However, Fakir and Chasomeris (2019) explained that from 2018 it applied an equitable tax rate approach that is derived from the corporate tax rate applied to the group profit, shared between the sums of all the pre-tax profits of profit-making divisions within the group. Fakir and Chasomeris (2019) calculated that over the years from 2011 to 2017, port users could have saved R2.6bn had the equitable tax rate been applied. Since 2018, the PRSA applied an annual equitable tax rate that is typically in the range from 15% to 15.5%. As soon as the NPA becomes a subsidiary of Transnet, then the corporate tax rate of 28% may be applied. Thirdly, the asset beta should be set to zero rather than the present 0.35. The PRSA historically allowed an asset beta of 0.5, but port users such as South African Association of Ship Operators and Agents and articles such as Chasomeris (2015) and Gumede and Chasomeris (2017b) argued for an asset beta lower than 0.5. For the period 2021/2022–2023/2024, the PRSA is now applying an asset beta of 0.35. However, PRSA (2020:7) stated: 'The actual calculated beta of the NPA is closer to 0 because of the reasons set out above'. Moving forward, there could be merit in planned annual reductions in the value of the asset beta (Chasomeris 2020). Finally, if the RAB, the asset beta and the correct tax rate are applied, then there would be much less of a need to draw upon the ETIMC. As a result, this would contribute towards a more sustainable use of the ETIMC. Essentially, the funds available in the ETIMC would be available to be used over the coming years to endure that weighted average tariff increases remain low (below CPI inflation increases) and stable.

Tariff adjustments using the RR model are significantly dependent upon trade volumes. The COVID-19 lockdowns, both in South Africa and abroad, substantially reduced port trade volumes. Consequently, the average tariff increase applied for by the NPA was significantly higher. As a result of

COVID-19 lockdowns and the significantly reduced forecast trade volumes the NPA calculated using the RR model a weighted average tariff increase of 19.4% would be required for the financial year 2021/2022. The TNPA however acknowledged the extremely difficult economic environment and proposed a weighted average increase of about 3% and made an application to PRSA accordingly. In order for the average tariff increase to be 3% rather than the 19.4%, TNPA requested to use R1.201bn from the ETIMC. After consultation and analysis, the PRSA ultimately allowed a weighted average increase in tariffs of 0%. Essentially, such an outcome was achieved largely by drawing R1.201bn from the ETIMC. The amount available in the ETIMC in 2019/2020 was R3.158bn and in 2020/2021 it was R2.802bn. Drawing R1.201bn in 2021/2022 and R1.188bn in 2022/2023 has left only R645m in the account (PRSA 2021b). Obviously drawing so extensively on the ETIMC is not a long-term sustainable strategy for keeping TNPA prices low and stable.

For the 2022/2023 tariff year (01 April 2022 to 31 March 2023), the NPA used the RR model to calculate an increase of 23.96%. However, by asking the Regulator to allow R1.251bn to be used/drawn (subsidised) from the ETIMC, the NPA was able to make an application for a weighted average increase of 9.4%. Nevertheless, because of the tariff strategy agreed between the NPA and PRSA, this means that, for example, marine services would increase by 17.83%, coal exports by 12% and automotive trade by 0%. Such increases are undesirable for port users and especially shipping lines. Furthermore, the substantial R1.251 draw down from the ETIMC is not sustainable. Indeed, there is insufficient fund in the ETIMC to allow for another withdrawal of such a magnitude and the NPA application forecasts that they would be able to only draw down about R499 for the 2023/2024 tariff year and R0 is forecast for the 2024/2025 tariff year (TNPA 2021). Accordingly, our scenario analyses show the impact of adjusting the value drawn from the ETIMC on tariffs.

The 2022/2023 NPA tariff application of 23.96%, reduced to 9.4% by using the ETIMC, partly shows the impact of COVID-19 lockdowns on lower trade volumes but also includes an assumption that the NPA is a subsidiary of Transnet and therefore allowed a pass-through of corporate tax at 28%. However, at the time of the NPA application, and the writing of this article, the NPA was still a division and therefore only entitled to use the equitable tax rate (that on average is annually about 15%). In other words, the NPA's 2022/2023 tariff application uses a 28% corporate tax rate and this is incorrect as it should be using an equitable (proportional) tax rate, which is about 15%. Accordingly, the following section uses the RR model to calculate the impact on revenues and tariffs of using an equitable tax rate (assumed to be 15.5%) rather than the 28% tax.

## Ethical considerations

The Graduate School of Business and Leadership, University of KwaZulu-Natal, has granted exemption from Ethics Review for this study (00014026).

## Revenue required methodology: results and discussion

This section shows the results from using the RR model to calculate potential NPA revenues and the associated tariff adjustments under five distinct scenarios. The discussion of each scenario (Table 1) begins with a brief explanation about the main differences in assumptions about the value of the RAB, the asset beta, the tax percentage to be used and the use or unuse of the ETIMC. Adjusting these values in the RR calculation will then result in significant changes to the revenue required and the associated tariff adjustments.

The calculations in Table 1 can be explained as follows:

- **Scenario 1** recalculates the NPA application to the PRSA using the same variable assumptions used by the NPA application. The value of each of the variables is shown in Table 1. It assumes the presently allowed RAB opening net book value of R78 447m, an asset beta of 0.35, a tax rate of 28% and the use of the ETIMC of R1.251m. The NPA made an application for R10 648m; however, our calculations in scenario 1 show a revenue requirement of R10 646m, a R2m difference. We believe the difference is because of rounding off errors (or different assumptions about the number of decimal places to use when rounding off). Nevertheless, such a difference would result in a reduction in the tariff increase from 23.96% to 23.93%.
- **Scenario 2** assumes the presently allowed RAB of R78 447m, an asset beta of 0.35, an equitable tax rate of 15.5% and no use of the ETIMC. The results show a required revenue of R10 194m that translates into an 18.66% increase in tariffs.
- **Scenario 3** assumes the presently allowed RAB of R78 447m, an asset beta of 0.35, an equitable tax rate of 15.5% and an ETIMC of R1.251m. The calculation results in a required revenue of R8 943m and a tariff increase of 4.10%.
- **Scenario 4** assumes that the presently allowed RAB is reduced by R29bn, that is, the opening RAB is assumed to be R49 447m. The equitable tax rate of 15.5% is assumed and the asset beta is assumed to be zero. The calculation assumes that there is no use of the ETIMC. The results show a required revenue of R8 096m and a tariff decrease of 5.76%.
- **Scenario 5** assumes that the presently allowed RAB is reduced by R29bn, that is, the opening RAB is assumed to be R49 447m. The equitable tax rate of 15.5% is assumed and the asset beta is assumed to be zero. In addition, the ETIMC of R1.251 is assumed to be allowed. The results show a required revenue of R6 845m and a tariff decrease of 20.32%.

The results from the five scenarios show the potential reduction in NPA tariffs. The scenarios show the results of justifiable adjustments in the RR model variable assumptions and values that, for example, in the case of scenario 5 could lead to a weighted average tariff decrease of 20.32%.

**TABLE 1:** Recalculation of the National Ports Authority tariff application for 2022 and 2023: five scenarios.

Main differences in RR model variable assumptions:	R'm				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	NPA Application Assumes Asset beta 0.35; present asset base; 28% tax; No ETIMC	RAB of R78 billion; 0.35 Asset beta; 15.5% proportional tax; No ETIMC	RAB of R78bn; 0.35 asset beta; 15.5% proportional tax; ETIMC R1.2bn	RAB of R49bn; 0 Asset beta; 15.5% proportional tax; No ETIMC	RAB of R49bn; 0 Asset beta; 15.5% proportional tax; ETIMC of R1.2bn
Opening net book value (01 April)	78 447	78 447	78 447	49 447	49 447
Inflation indexation	3452	3452	3452	3452	3452
<b>CAPEX indexation</b>					
Less: Depreciation	2560	2560	2560	2560	2560
Plus: CAPEX latest estimate	2454	2454	2454	2454	2454
Closing net book value (31 March)	81 792	81 792	81 792	81 792	81 792
Average asset base	80 120	80 120	80 120	65 620	65 620
Less: Working capital	-738	-738	-738	-738	-738
<b>Regulatory asset base</b>	79 382	79 382	79 382	64 882	64 882
Inflation forecast (%)	4.35	4.35	4.35	4.35	4.35
Nominal risk-free rate (%)	9.33	9.33	9.33	9.33	9.33
Real risk-free rate (%)	4.77	4.77	4.77	4.77	4.77
Market risk premium (%)	5.10	5.10	5.10	5.10	5.10
Asset beta	0.35	0.35	0.35	0.00	0.00
Equity beta (using Hamada)	0.60	0.65	0.65	0.00	0.00
Debt beta	0.00	0.00	0.00	0.00	0.00
Gearing	0.50	0.50	0.50	0.50	0.50
Debt/equity ratio (%)	100.00	100.00	100.00	100.00	100.00
Nominal weighted average cost of debt (WACD) (%)	10.75	10.75	10.75	10.75	10.75
(Equitable) tax rate (%)	28.00	15.50	15.50	15.50	15.50
Real post-tax cost of equity (%)	7.84	8.07	8.07	4.77	4.77
Real pre-tax weighted average cost of debt (%)	6.13	6.13	6.13	6.13	6.13
Real Vanilla WACC (%)	6.99	7.10	7.10	5.45	5.45
<b>Regulatory asset base</b>	79 382	79 382	79 382	64 882	64 882
Vanilla WACC (%)	6.99	7.10	7.10	5.45	5.45
Return on capital	5547	5636	5636	3538	3538
Plus: Depreciation	2560	2560	2560	2560	2560
Plus: OPEX	5919	5919	5919	5919	5919
Plus: Taxation Expense	1211	670	670	670	670
Plus/Less: WEGO	-151	-151	-151	-151	-151
Plus/Less: Clawback	-355	-355	-355	-355	-355
Plus/Less: ETIMC	-	-	-1251	0	-1251
<b>Revenue allowed</b>	14 731	14 279	13 028	12 181	10 930
Less: Real estate	-4085	-4085	-4085	-4085	-4085
<b>Marine revenue</b>	10 646	10 194	8943	8096	6845
Prior year revenue	8163	8163	8163	8163	8163
Estimated volume growth (%)	5.24	5.24	5.24	5.24	5.24
Revenue after volume growth	8591	8591	8591	8591	8591
Revenue required	10 646	10 194	8943	8096	6845
<b>Tariff increase (%)</b>	<b>23.93</b>	<b>18.66</b>	<b>4.10</b>	<b>-5.76</b>	<b>-20.32</b>

Source: Authors' own compilation (RR calculation using an Excel model adapted from Chasomeris, M., 2015, 'Port infrastructure pricing: A critique of the revenue required methodology', *International Journal of Transport Economics* XLII(2), 153–170; Gumede, S. & Chasomeris, M.G., 2017b, 'A critique of South Africa's national ports authority's revenue required pricing methodology', *International Journal of Transport Economics* 44(4), 611–632

NPA, National Ports Authority; RAB, regulatory asset base; WACD, weighted average cost of debt; ETIMC, excessive tariff increase margin credit; WEGO, weighted efficiency gains from operations; RR, rate of return.

R'm = Rands (in millions)

The PRSA Record of Decision (PRSA 2021b) ultimately decided to allow an overall 4.8% weighted average tariff increase for 2022/2023. This translates into marine services (shipping line) increases of 12%, an increase of 11% in dry bulk cargo dues for coal and 15% for magnetite, but container cargo dues are to remain unchanged and all other tariffs are to increase by 4.2% in line with the expected inflation. To achieve such a tariff adjustment that is lower than the NPA requested, the PRSA is allowing R1.188bn to be drawn from the ETIMC. The PRSA is treating the NPA as a subsidiary (even though the NPA is not yet a subsidiary) and is hoping that the NPA

becomes a subsidiary within the 2022/2023 year. Consequently, PRSA is allowing the use of a 28% tax rate as opposed to the equitable tax rate of just over 15%. Our recommendation is that the NPA should not be treated as a subsidiary of Transnet until it actually becomes a subsidiary. If at some stage during 2022 it becomes a subsidiary, then for those months of the year the 28% tax rate could be applied. For the months that it remains a division, it should be treated as such and port users only would require to contribute revenues to cover the equitable tax rate of just over 15%. Otherwise, port users will be paying higher taxes and our results show such additional



costs (taxes) more than R540m. Such an outcome may result in the TNPA cross-subsidising the Transnet group as it may contribute an unfairly greater portion towards the Transnet group taxes – in a similar way to the first 7 years of regulation where port users could have paid R2.6bn less had the average equitable tax rate of 15.73% been applied rather than the 28% corporate tax rate (Fakir & Chasomeris 2019).

## Conclusion and recommendations

The COVID-19 pandemic has created fundamental challenges globally and in South Africa it was exacerbated by a set of other events before and after the COVID-19 pandemic outbreak. Globally, one of the greatest impacts was on shipping costs that increased exponentially. South Africa has also felt the impact of these freight rate increases severely; however, freight rates are an issue over which local authorities have little control.

This study aimed to analyse the impact of COVID-19 disruptions and showed the adverse effects of the pandemic, including higher liner freight rates, on South Africa's ports. This study also highlighted the role of port pricing, NPA tariffs and reduced investments in port infrastructure. These are factors that can be controlled locally to enhance the cost-effectiveness and competitiveness of South Africa's maritime sector.

The PRSA (2021) benchmarking study shows that South Africa's port authority charges are 69% above the global benchmarked mean and that cargo dues are 166% above the mean. There is the possibility of reducing NPA tariffs by as much as 20% (see the 'Methodology' and 'Results' sections). This article provides the justification and evidence to reduce NPA charges at South Africa's eight commercial ports.

The South African economy experienced a severe recession in 2020, largely because of the extreme COVID-19 lockdown measures imposed. Real GDP declined by 7% accompanied by significant reductions in trade volumes handled in South Africa's ports. The section 'Trends in cargo volumes and container freight rates in South Africa' shows the decrease in container volumes and parallel increase in container freight rates from 2020 onwards. The reduction in port trade volumes contributed to sharp increases in the NPA tariff applications (19.4% for 2020/2021 and 23.96% for 2022/2023). The NPA capital expenditure investment declined from R1598m in 2019/2020 to R684m in 2020/2021.

For 2022/2023, the NPA applied for a weighted average tariff increase of 23.96%. The PRSA allowed an overall 4.8% weighted average increase but it required using R1.188bn from the ETIMC (essentially a subsidy) and such a scenario trend of heavily drawing on the ETIMC is not sustainable as there are insufficient funds in the account. Our results from the five RR scenarios examined and justified how the tariff application could and should have been much lower – in the case of the adoption of scenario 4, a tariff decrease of 5.76% and in the case of scenario 5 a 20.32% tariff decrease.

In summary, based on the evidence, our main recommendations are as follows. Firstly, there should be a reduction in the RAB by R29bn and this reduction may be phased, perhaps over 2 or 3 years. Secondly, the use of an equitable tax rate of 15.5% should be used as long as the NPA remains a division of Transnet. As soon as the NPA becomes a subsidiary of Transnet, then the corporate tax rate of 28% may be applied. Thirdly, the asset beta should be set to zero rather than the present 0.35. Finally, if the RAB, the Asset beta and the correct tax rate are applied, then there would be much less of a need to draw upon the ETIMC. As a result, this would contribute towards a more sustainable use of the ETIMC, ensuring that average tariff increases remain below inflation. Implementing these recommendations should result in a real decrease in NPA tariffs, particularly cargo dues, hence benefiting port users and contributing to the goals of the PRSA and the NPA. Indeed, our calculations showed in scenario 5 that it is even possible to reduce the NPA weighted average tariff by 20.32%. Such reductions in port charges are not only justifiable but also desirable as they promote the feasibility, sustainability and competitiveness of companies that trade through South Africa's ports, especially post-COVID as part of the recovery path of the local supply chains.

## Acknowledgements

The authors give thanks to God for His grace and guidance. The authors would also like to thank the North-West University and University of KwaZulu-Natal for their continued support.

## Competing interests

The authors have declared that no competing interests exist.

## Authors' contributions

S.G. and M.G.C. conceived of the presented idea. Both authors developed the theory and S.G. wrote the majority of the literature background. S.G. performed the computations in section 'Trends in cargo volumes and container freight rates in South Africa'. M.G.C. contributed to the literature background and performed the computations and analytical work in sections 'Port pricing in South Africa', 'Revenue required methodology in context' and 'Revenue required results and discussion'. All authors discussed the results and contributed to the final manuscript.

## Funding information

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

## Data availability

All data used in this study were secondary and obtained from publicly available databases.

## Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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