SOUTH AFRICA'S PORT PRICING METHODOLOGY AND FINANCING INVESTMENTS

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Abstract

This paper critiques the port pricing methodology, the required revenue (RR) model, and recommends possible enhancements to South Africa's port pricing model. As a developmental state, South Africa has committed to massive infrastructure investments in which state-owned entities (SOE) are the custodians. The SOE, Transnet National Ports Authority (TNPA), uses the RR model to recover port investments, all port costs and to make a profit. TNPA and the Ports Regulator agree that the RR method is not designed for ports but, with the absence of a better method, it is used. RR does not provide any incentive to reduce costs or to improve productivity. Furthermore, the current RR assumes zero debt beta (βd) and equates TNPA's asset beta (βa) to the Queensland's Competition Authority, of 0.5, which faces a different market environment to TNPA. This paper uses content analysis of the stakeholder submissions on port pricing, submitted from 2009 to 2014. A price capping model has the potential to encourage TNPA to reduce costs and improve productivity. The recovery of port infrastructure investment can be spread across the useful life of such infrastructure in order to reduce costs. TNPA can continue to use the capital asset pricing method to measure the return on equity, however, a slightly lower βa should be used and the βd should be considered.

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1. Introduction

Price is a systematic economic tool used to achieve allocative efficiency of resources. The pricing method chosen should enable a firm to be able to provide sufficient goods and services necessary for consumption by its customers. The equilibrium price theory suggests that, holding all other things constant, under-priced goods and services create a shortage, while over-pricing would create an excess supply. South African ports are generally considered to be among the most over-priced ports, while being among the least productive or efficient ports in the world. Button (1993: 122) argued that "there is no such thing as the 'right' price but rather there are optimal pricing strategies which permit specified goals to be obtained." For example, Bennathan and Walters (1979) argue that the optimal price for a port whose success is measured on the profitability will differ from that whose success is measured on how it contributes to social welfare and economic development. Ports whose success is measured on profitability would most likely appear to be over-priced when compared to ports whose success is measured on how they contribute to social welfare. South Africa's ports are priced to cover costs, to recover investments and to make profit.

Acciaro (2013) reviewed port pricing literature published in various journals from 1975 to 2013. Most papers make use of conceptual economic models and game theory and there are limited empirical studies that deal with port pricing methodology (Acciaro, 2013). Chasomeris (2015) notes that the studies reviewed do not appear to mention the Required Revenue (RR) methodology. This paper critiques the RR methodology that is used to determine the port tariff application in South African ports in order to fund infrastructure investments, to cover all port costs and to earn profit. This paper proceeds with a discussion of port pricing literature and tariff methodology for the setting of South African port tariffs in section 2; content analysis of the stakeholder submissions on port pricing methodology in South Africa in section 3; Section 6 concludes.

2. Tariff Methodology for the Setting of South African Port Tariffs

TNPA and the Ports Regulator of South Africa presently use the required revenue (RR) method as the methodology for determining system-wide price adjustments for South Africa's ports. The rational for port pricing in South Africa is to cover all port costs, recover all port investments and to make profit. Without a better understanding of the economic and political contexts of South Africa's ports, and the country's vision at large, it is challenging to advocate for a particular tariff methodology that TNPA should use. South African port pricing, and port efficiency and productivity have been widely criticised by South African ports stakeholders. Part of the discontentment being expressed by the stakeholders is as a result of the challenges that the South African ports system still needs to confront. These challenges include ports under-investments, old technologies, old machinery, skills shortages, high levels of unemployment, increasing congestion, poor regional integration, the carbon intensity of the current system, and weak maritime connectivity (Transnet, 2010 and Gumede, 2012). Debates about whether the current institutional structure will be able to better deal with these challenges are still taking place between government and ports stakeholders. Gumede (2012) submitted that old technologies, machinery and equipment may be the source of inefficiencies and under-production observed in South African ports. Indeed, it is more costly to operate old machinery than new machinery. UNCTAD (1995) stated that port pricing can be used to generate revenue required, to (re)invest in infrastructure and technological enhancements, in order for a port to reduce delays and inefficiencies, thus increasing capacity and productivity.

South African ports are state-owned. As such, they would be expected to contribute to the country's economic growth. The literature reveals that for such a port, the pricing strategy should not have profit as an aim. The South African ports system uses the RR model to determine fair returns for TNPA. Since the 2010-2011 financial year, the Ports Regulator of South Africa has opened the tariff determination process to stakeholders' participation. More specifically, each year the tariff approval process takes place as follows:

i.   TNPA has to apply for tariff approval to the Ports Regulator;

ii.   The Ports Regulator publishes the application and invites stakeholders to submit their comments through tariff roadshows and written comments;

iii. The Ports Regulator then assesses the tariff application and uses the regulatory framework, stakeholders' comments, South African ports legislations and policies, and its own research to make a decision.

There are four points TNPA (2012: 5) presents as the strengths of using the required revenue model.

- *RR ensures that the Authority in accordance with the Regulator's Directives, namely Directive 23(2) (as amended):*

  o *recovers its investments in port services and facilities;*
  o *recovers its cost of operations; and*
  o *achieves a return sufficient to recover the opportunity cost of the capital employed in the production of the regulated services.*

- *RR provides efficient price signals to market participants and consumers and provides the Authority with the incentive for efficient investment in relevant infrastructure and services;*

- *RR promotes the regulatory independence and certainty with its full disclosure requirement, including a system for smoothing tariff adjustments;*

- *RR is commonly used in other regulated industries*.

Historically, the regulated RR method has been criticized for "providing inappropriate incentives to regulated firms and for being costly to administer" (Liston, 1993: 25). The past half century has demonstrated that the regulated RR model has become unsatisfactory in a forever changing consumer demand and technological environment. Price-cap (PC) regulation has therefore been proposed and adopted. It is regarded as a more efficient and less restrictive alternative method. Under PC, the regulator uses price indices to fix ceilings on prices. Liston (1993) reviewed advantages and disadvantages of both RR and PC methods. Table 1 outlines advantages and disadvantages of the regulated RR method and the PC method.

Table 1: Advantages and Disadvantages of regulated RR and PC Methods

	RR Method	PC Method
Advantages	- It permits regulators, in a relatively simple manner, to limit monopoly pricing through a close monitoring of the firm's profits.	- The incentive to minimize cost re-emerges because the regulatory link between costs and ceiling prices is severed.

	• Administered prices combined with restricted entry allow second-best or non-linear prices to be enforced. • By deliberate cross subsidization, regulators can achieve non-economic goals • The rate hearings provide a forum where consumers have an opportunity to formally air their views about prices and quality of service, the firm can defend its record, and the regulator acts as an arbitrator	• The connection between profits and the rate base is broken, removing the input bias. • PC carries smaller administrative costs than its RR counterpart. • Price ceilings on monopoly services can help to prevent predatory pricing of competitive services
Disadvantages	• The cost-plus characteristic of RR blunts the firm's incentive to produce efficiently, i.e., at minimum cost. • Predatory pricing behaviour becomes difficult to detect. • Authority may also divert revenues to subsidiaries operating in competitive markets so as to circumvent regulatory constraints on allowable profit. • Authority may have an incentive to produce an inefficient level of output in competitive markets it serves. • There is a possibility that the firm will "capture" the regulatory body, which in tum will allow the firm to earn excess profits or to incur unnecessary costs. • RR regulation also creates important financial inefficiencies. • RR regulation entails high administrative costs and time-consuming hearings and requires considerable knowledge about the	• PC also provides incentives for firms to lower service quality. • Incentives for predatory pricing will persist if both competitive and regulated services are subject to the same factors • Implementing price caps in the context of informational asymmetries can be ostentatious. • Regulators have greater potential for capture of the regulatory process by the firm. • Regulated firm may not have the incentive to service the classes of customers with the highest costs or the lowest willingness to pay. • PC deprives consumers of a forum through which they can express their preferences.

	firm's costs and consumers' demands.	

Source: Authors created using information from Liston (1993)

Van Rensburg et al (2011: 163) note that pricing, under natural monopolies, has been subject to regulations "although recent trends have been to deregulate part of industries where competition seems possible" and regulators in South Africa are beginning to allow new entrants. Nevertheless South African regulators still regulate prices that natural monopolies could charge, for example TNPA tariffs, Transnet Pipeline tariffs, and ESKOM prices.

The pricing of marine infrastructure is one of the biggest challenges facing the Ports Authority. The basic infrastructure in ports is considered to be permanent or non-renewable, with a single purpose only. However, the use of the asset by one vessel does not prevent the use of that same asset by other vessels, in uncongested conditions. The exclusion principle thus does not apply and no specific costs can be attributed to the passage of one particular ship, but rather, costs are common to all users (Van Niekerk, 1994). A further feature of marine assets is the initial large and essentially sunk, fixed costs of creating the facilities, coupled with a marginal cost of usage that is virtually zero.

Anold (1985), UNCTAD (1995), and Haralambides (2002) argue that subsidies may be necessary for public ports, especially when they have economic development objectives. The South African economy supports self-sufficient state-owned entities. The South African Supreme Court ruled out the socially optimal pricing (marginal cost pricing) because it was leading to losses and long term bankruptcies and 'held that the regulatory agencies must permit a "fair return" to utility owners' (van Rensburg et al, 2011: 164). Fair-return price modifies the objectives of allocative efficiency. A fair-return price would essentially allow a price equal to average total cost and total costs include a normal of "fair" profit.

Historically, the tariff determination process presented gaps between what was applied for by TNPA and what the Ports Regulator approved (see Table 2). These gaps present industry uncertainty as to whether TNPA and the Ports Regulator have a common understanding of the model and its application. Ports stakeholders have raised several concerns about the applicability of the RR method to determine port pricing in South Africa.

Table 2: Historic gaps between the figures used by TNPA and those allowed by the Ports Regulator, 2010/11 to 2015/16

Tariff Components	2010/2011		2011/2012		2012/2013		2013/2014		2014/2015		2015/2016	
	TNPA Proposal	Regulator's Decision	TNPA Proposal	Regulator's Decision	TNPA Proposal	Regulator's Decision	TNPA Proposal	Regulator's Decision	TNPA Proposal	Regulator's Decision	TNPA Proposal	Regulator's Decision
	R million	R million	R million	R million	R million	R million	R million	R million	R million	R million	R million	R million
RAB	45 677	43 165	51 480	48 529	58 490	60 001	66 315	62 803	64 694	64 485	67 000	66 789
WACC	6.02%	5.15%	5.38%	4.71%	8.97%	6.13%	8.33%	5.21%	5.83%	5.47%	5.59%	6.38%
RR	__	**6 020**	7 641	**6 523**	9 645	**6 150**	8 419	**7 982**	8 834	**8 032**	8 759	**8 266**
Tariff Increase	**10.62%**	**4.42%**	**11.91%**	**4.49%**	**18.06%**	**2.27%**	**5.40%**	**0.00%**	**14.39%**	**5.90%**	**9.47%**	**3.55%**

Source: Author compiled using data from Chasomeris, 2011; Ports Regulator, 2010; 2011 and 2012 and TNPA, 2009; 2010, 2011, 2012, 2013 & 2014.

The gaps observed between the TNPA tariff revenue proposals and the Ports Regulator decisions creates uncertainty for TNPA, port users and investors. The gaps raise further questions on whether TNPA fully understands the industry it is operating in or if TNPA understands the regulatory framework. Such uncertainties present port users with difficulties in their forecasting for annual tariff changes in the ports. To assist with reducing the gap the Ports Regulator, since the 2014-2015 tariff application, decided to publicise its regulatory framework which TNPA would use in to apply for tariff increases. Nevertheless, gaps were still observed. The Ports Regulator then decided to approve a multi-year tariff application method which would work from the 2015-2016 until the 2017-2018 tariff year. This was hoped to reduce the gaps and industry uncertainty, however, in the first year of its existence, gaps in revenues still continue to be observed. Furthermore, Gumede and Chasomeris (2015) observed that, using the RR model, both TNPA and the Ports Regulator could not forecast the revenues correctly. The trends present a history of revenue over-recovery by TNPA and as a consequence the excess revenues were transferred into an account or fund called the excessive tariff increase margin credit (ETIMC). At the beginning of the 2013/14 tariff year the ETIMC was R900 million, the closing balance for the same year was R2.39 billion (Ports Regulator, 2013b).

3. Content Analysis of Stakeholders' Submissions on Port Pricing Methodology

One of the challenges faced by the Regulator when using stakeholders' perspectives in the tariff determination is that, the comments that the stakeholders raise are not uniformly structured, some are just not structured, and most stakeholders submit comments which focus on their own self-interest, which is not always beneficial to the industry as a whole. The time period the Regulator has to assess these stakeholders' comments is also limiting. Moreover, although approaching a decade since its establishment, the Ports Regulator of South Africa is currently 'operating at 45% of full strength' because it still lacks sufficient resources to execute its duties effectively (Farrell 2013: 17).

The content analysis of stakeholders' written submissions commenting on applicability of port pricing methodology in South Africa reveals three major themes, namely: TNPA lacks full transparency in reporting; tariff increases that are above the country's inflation; and the port pricing method needs to set right incentives.

3.1 A critique of the RR model assumptions

Chasomeris (2013) has constructively critiqued the assumptions used in the calculation of the weighted average cost of capital (WACC) used to calculate the rate of return for TNPA's regulated asset base (RAB). The asset beta used does not tell the true story of South African port assets. Asset beta is a measure of risk of the company's assets arising from exposure to general market movements as opposed to individual factors (Rashinkar, 2014). Understandably, as an SOC, TNPA's assets are not tradable and it is challenging to calculate their exposure to market risk. Nevertheless, both TNPA and the Ports Regulator have opted to use the asset beta of 0.5. The reason provided by the Ports Regulator is that 0.5 is the asset beta used by the Queensland Competition Authority (QCA). Although Queensland's seven ports, like South African ports, are subject to economic regulation, their exposure to market risks cannot be the same as South African ports. Chasomeris (2013) argues for an asset beta which is lower than QCA's 0.5.

Following on from this, the asset beta is then used to derive the equity beta. The Ports Regulator (2013b and 2014b) suggests that given the targeted debt-to-equity ratio of 1:1, an asset beta of 0.5 would equate to an equity beta of 0.86, using the Hamada equation to re-lever the beta. The formula used by the Ports Regulator is:

$$\beta e = \beta a[1 + (1 - t)\left(\frac{D}{E}\right)] \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{ (1)}$$

$$= 0.5 \ [1 + (1 - 0.28)(1/1)]$$

$$\underline{= 0.86}$$

Where

βe is equity beta

βa is asset beta

t South African Corporate tax of 28%

D TNPA's Debts

E TNPA's Equity

Jones et al (2010) argue that this formula is only applicable if the entity is debt free. Conversely, TNPA appear to have risky debts. TNPA Tariff Applications from 2009 to 2014, and the Ports Regulator Records of Decision from 2010 to 2015, present the risks of TNPA

debts as being above the risk-free rate. It is then necessary to consider the beta for debts if one is trying to get a fair reflection of equity beta re-levered from the asset beta. The more appropriate Hamada equation that the Regulator should have used is:

$$\beta_e = \beta_a + (\beta_a - \beta_d)(1-t)\left(\frac{D}{E}\right) \quad \text{... (2)}$$

When a debt beta is considered, lower levels of weighted average costs of capital can be achieved. A scenario exercise was demonstrated by Chasomeris (2013) for the 2014/15 TNPA tariff application. TNPA had initially applied for 14.39% tariff increase, however, if the asset beta could be decreased to 0.4 and debt beta is considered, using the same methodological formula, the tariff increase required could be 6.1%. Table 3 shows the effect of changing the assumptions of TNPA's capital exposure to market risks.

Table 3: Changing Market Exposure Risks Assumptions

	Application	If βd is considered	Reduce βa to 0.4	Reduce βa to 0.4& Consider βd
Asset Beta	0.5	0.5	0.4	0.4
WACC	5.82	5.45	5.21	4.84%
Revenue (Millions)	R8 827.04	R8 589.48	R8 432.01	R8 194.46
Increase	14.39%	11.22%	9.18%	6.1%

Source: Adapted from Chasomeris, 2013.

Apart from the assumptions of capital risk exposure to the market that TNPA would need to appropriately determine, it would need to gather more accurate forecast of the market risk premium, inflation and the volume growth.

Finally, notable is the discrepancy in TNPA's applied for Regulatory Asset Base (RAB) and the regulator's approved RAB. RAB is the value of assets that TNPA is allowed to earn return on (TNPA, 2013). This includes the value of current assets and the value of invested assets. In the Ports Regulator's Record of Decision for the 2013/14 tariff determination, it was stated that TNPA had been including assets that were used by their sister division, Transnet Port Terminals (Ports Regulator: 2013). This error had to be corrected retrospectively. Furthermore, TNPA is not allowed to earn returns on investments that are not currently

foreseeable for the date of use, such as investment made for the new port to be dug out approximately 10 kilometres south of the Port of Durban.

Port users have consistently raised their dissatisfaction on the valuation and clarification of TNPA capital expenditure. These matters are then dealt with by the Port Consultative Committees (PCCs) and the National Ports Consultative Committee (NPCC). Cross-subsidisation is prevalent in financing investments, as the current 'build local, pay national' system is in place. With the current uniform pricing system, port users from different ports would pay for investments even if they would not directly benefit from them. For example, container port users in Durban also pay for the manganese export expansion project in the Port of Nqura. Gumede (2012) noted that port users, in the past, have paid for TNPA miscalculated investments. Underutilisation of port infrastructure facilities in South African ports has also been observed.

3.2 TNPA lacks full transparency reporting

This point would require sufficient details of the authority's business and costing that would enable efficient regulations. However, TNPA has been criticised for the lack of information in their reporting. Gumede and Chasomeris (2012) and Gumede (2012) confirmed that such a lack of information and transparency from TNPA hinders proper regulation in the sector.

Stakeholders' submissions argue that TNPA lacks transparency in their reporting and they provide insufficient information and justification in their tariff application. These ten submissions comprise two out of three submissions for 2010/11, six out of thirty for 2011/12, and two out of fifteen for 2012/13. Xpanse (2011) submitted that the TNPA 2012/13 tariff application was not complete. SAASOA (2009) noted that the whole of the tariff was not provided. SAASOA (2009) argued that it is impossible properly to appreciate the overall impact of the proposed tariff if TNPA only provide proposed figures exclusive of the terms and conditions in respect of which they operate. Furthermore, SAASOA (2009) mentioned that it would be difficult to make proper submissions in circumstances where the proposed terms are not known. FPEF (2011) note that TNPA did not provide sufficient information as the directives require. Xpanse (2011) and Columbus Stainless (2010) argued that TNPA did not fully disclose all its operating expenses and they also did not provide sufficient explanation on expense items whereby the forecasted increase was above inflation as it was required by the Regulator's ROD. Furthermore, Xpanse (2011) noted that TNPA did not adhere to the call by the Regulator's ROD to break down the sundry cost element in the operating expenses as it appears to be the second largest cost category. Furthermore "the tariff fails to distinguish between the provision of a pilotage service using

a launch or a pilot helicopter" (SAASOA, 2009: 1). SAAFF (2009) noted that TNPA did not provide sufficient rationale with regard to the uniform price increase for all TNPA services; "there appears no rational explanation as to why the provision of, for example, Pilot Helicopter use should experience exactly the same cost pressures as a Fire Team Training course" (SAAFF, 2009: 3). Deneys Reitz (2010: 1) stated that "there is currently no explanation available from TNPA for the tariff increase."

General Motors SA (2010), Mercedes (2010) and NAAMSA (2010) noted that TNPA did not provide a transparent rationale as to the adjustment of the automotive sliding scales which have created additional costs to the automotive industry. NAAMSA (2011) argued that the TNPA tariff application does not provide sufficient details to interrogate whether cross-subsidisation exists or not. Cox Yeats (2010) argued that TNPA has consistently failed to provide justifiable rationale for the substantial disparity between tariffs charged for stainless steel and tariffs charged for other steel products. Mondi (2010) argue that the tariff application did not reveal the level of risk assumed by the TNPA, thus making it difficult to properly understand the whole tariff methodology. The level of details provided by TNPA does not allow port users to properly interrogate the justification for the requested tariff increment (NAAMSA, 2010). However, SAASOA (2010) acknowledges that the level of details in the 2011/12 TNPA tariff application has improved. FPEF (2011), NAAMSA (2010) and Xpanse (2011) proposed that the Regulator should request that TNPA provide details on (1) how Capex requirements were determined, justified and calculated; (2) Cash flow forecast; (3) the calculation of the forecasted costs; (4) the previous year's earnings before tax as the percentage of revenue; (5) the estimated increase in volume; (6) the manner in which the tariff will affect the cost of doing business in South Africa; (7) the promotion of access to South African ports. Without access to detailed information it is extremely difficult to properly understand the rationale that TNPA employed (NAAMSA, 2010; SAAFF, 2010). NAAMSA (2011) suggested that TNPA should disclose the rationale and the basis for re-valuating their Required Asset Base. Insufficient information provided by TNPA will hamper the regulation processes (FPEF, 2011).

TNPA contradicts itself by their lack of transparency. TNPA's pricing strategy requires TNPA to provide sufficient detail for regulation (TNPA, 2012).

Furthermore, as this model suggests that port users pay for operating costs, TNPA have to be more transparent on their operating costs. Some of these costs that TNPA transfer to port users may be due to inefficiencies and under-calculated decisions. Since TNPA have moved towards a more cost-based pricing, there has been studies and benchmark on South African port pricing. However, there is a need for a costing exercise and benchmark of port

costs studies as well because the RR method does not afford TNPA any incentives to reduce costs. Such an exercise would also assist TNPA to identify areas in which they should focus on in their costs reductions.

A main component of South Africa's port pricing method is to recover investments. TNPA did not fully disclose their estimated payback period for their investments. Furthermore, Jones et al (2011) criticise TNPA for their investment decisions that are taken without being subjected to any form of diligence on the part of port users who would be expected to pay. The shorter the payback period the larger the tariff required. Gumede (2012: 109) criticise TNPA seeking "to recoup their investment for long-term infrastructure in a short period of time." Jones et al (2011) suggested two alternative funding models that TNPA should consider; project finance, and securitisation. Project finance will seek infrastructure investments to be funded by investors. This is aligned with the current port governance rhetoric for public-private partnerships (PPP) noted by Gumede and Chasomeris (2012). Investors will be entitled to a share of revenue or loss generated by the projects. The central advantage of project finance is that, it eliminates wasteful expenditures as the project will be subject to market inspection (Jones et al, 2011). Securitisation provides that the investments be financed by issuing debt securities which will be backed by the expected future cash flows. Like the project finance, investments funded by securitisation will mitigate wasteful expenditure on non-beneficial projects.

3.3. Tariff increases that are above country's inflation

The history of South African port prices, since 2001, has been observed to have an annual increase that is generally below inflation, as measured by the consumer price index (CPI). However, since the Ports Regulator became active in 2009 and the tariff determination process became open to stakeholders, TNPA has used the RR method to apply for tariff increases which are generally above CPI inflation. TNPA believe that charging tariff increases above inflation are necessary as they have massive obligation to invest in ports. South Africa has huge back-locks of infrastructure investments as they have not refurbish and under-invested in ports for more than three decades. TNPA need to invest in order for their infrastructure to accommodate and maintain the current port volumes and demands. Also, TNPA need to invest for the upcoming forecasted demand. TNPA has a longstanding strategy called the Market Demand Strategy that plans to create capacity ahead of demand. Their strategy is supported by the observed 'splits in personality' of the demand and supply for ports. Demand can change as the country's or global productivity change, whereas the supply is mostly fixed as ports are associated with high fixed costs.

3.4 The port pricing method needs to set right incentives

Gumede (2012) noted that stakeholders' submissions argued that the tariff methodology does not provide incentive for TNPA to reduce costs. Nor does it address the fact that in the TNPA cost and investment recovery some of the cost items may be due to inefficiencies. The RR model is a cost plus mark-up method. TNPA calculate their operating cost and their rate of returns for their investments and then add an amount they wish to profit for the year. The question that remains unaccounted for by this model is that; if port users are already paying operating costs and investment costs, where does the amount retained from profit go to? As ports in developing country whose actions are mindful of the country's economic landscape, the priority should be for economic development and growth (TNPA, 2012). Literature suggests that for a port to achieve economic development and growth it should not price to make profit, it can at most break even. Nevertheless, profits may be necessary if they are ploughed back to the port system and if they are in the best interest of an economy. As part of the bigger organisation, there is no evidence on TNPA retaining its own profit. The usage of such profit can reduce the amount in which TNPA apply for in their tariff to recover investments.

It may not be necessary to invest in infrastructure today if volumes handled by the port are not anticipated to grow. The higher the volume growth expected by the ports, the higher the port investments should be made, hence higher tariffs could be charged. Nevertheless, the required revenue model formulae places higher tariff increases if the volume growth expected by the ports are low and lower tariff increases if the expected volume growth are high. Below is the formulae used to calculate tariff increase for South African ports:

$$\frac{RR}{LER*EVG} - 1 = Tariff\ Increase \qquad \text{.. (3)}$$

Where:

RR is the required revenue for the year,

LER is last year's (previous year's) estimated/expected revenue, and

EVG is the expected volume growth.

Port volume growth is linked to the country's economic performance. As such, port users would not afford higher prices if they do not make sufficient profits, and vice versa. In a case of low volumes, higher port tariff increases may end up depressing volumes further as port users would consider using other competing ports, such as Maputo.

Although this RR method is widely used globally and in other regulated sectors in South Africa, such as energy and pipelines, it still presents numerous misunderstandings between stakeholders and in its application to the ports sector. Ports, although regulated like other sectors, provide different forms of services to its various stakeholders. The Ports Regulator (2011) acknowledges that RR is not an ideal model for ports; however the Regulator has allowed RR to be used until a better alternative is found. Over half a century ago, the RR method had been criticised for being unsatisfactory for deriving the prices of a regulated entity. The RR model was observed as creating inappropriate inducements to regulated firms and sometimes to budding entrants into the industry, moreover, it was costly to operate (Liston, 1993). Indeed, the RR method may incentivise bloated capital and operating expenditure and does little to incentivise improvements in productivity and service delivery.

4. Conclusions

The purpose of this paper is to critique the port pricing methodology that South Africa's ports use, the required revenue (RR) model, and recommends possible enhancements to South Africa's port pricing model.

Both TNPA and the Ports Regulator of South Africa confirm that RR model is not designed for ports; however since National Ports Act (12 of 2005) is silence on the pricing methodology to be used, neither exclude any particular method and with the absence of a better method, the RR method is used. This paper finds that assumptions used in the RR model to determine the weighted average cost of capital (WACC) do not represent the South African outlook. The model assumes TNPA assets exposure to market risk which is equivalent to the ports assets regulated by Queensland Competition Authority (QCA) (asset beta of 0.5), and TNPA's debt which are not exposed to any market risk (debt beta = 0). The authors conclude, however, that the TNPA asset beta should be lower than that of QCA since South Africa runs a complementary port system which prevents inter-ports competition, whereas QCA ports, although regulated and state owned like TNPA, they face market competition. These incorrect assumptions inflate the weighted average cost of capital which then lead to higher required revenue for TNPA and higher prices for port users. Moreover, TNPA should consider including a debt beta because their estimated cost of debts are higher than South Africa's risk free rate. ADD: conclusion about MRP…

In the developmental state that South Africa is currently pursuing, state owned entities are to play a leading role. The National Ports Acts 12 of 2005 provides that the port system needs to strengthen the State's capacity to facilitate the development of technology, information systems and managerial expertise through private sector involvement and

participation; and promote the development of an integrated regional production and distribution system in support of government's policies. TNPA has adopted a market demand strategy (MDS) for which they have to invest in infrastructure in order to create capacity ahead of demand. One of TNPA's major reasons for tariff increases is to cover port investments. Currently port users are paying for all TNPA investments, regardless of viabilities and profitability of such investments. The content analysis of stakeholders' written submissions commenting on applicability of port pricing methodology in South Africa reveals that TNPA: lacks full transparency in reporting; consistently applies for tariff increases that are above the country's inflation rate; and the port pricing method needs to be reconsidered in order to better incentivise cost reductions and improved productivity. This paper suggests two alternatives to infrastructure funding that TNPA has to be considered, namely project finance and securitisation. Neither project finance nor securitisation requires investments to be funded by port users. This would reduce the extent to which port users are paying for investments from which they do not directly benefit. Using either project finance or securitisation, TNPA would be able to reduce wasteful expenditure as the infrastructure investments should be more transparent and subjected to market scrutiny.

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