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Assessing Governance Structures in State-owned Enterprises using Transaction Cost Economics' Dimensionalisation

By Adeyemi Adebayo [*]

This paper illustrates how Transaction Cost Economics' (TCE) dimensionalisation, a governance structure comparative analysis tool, may be used in assessing corporate governance structures. To illustrate, this paper assesses the governance structures of state-owned enterprises (SOEs) in South Africa and Singapore, two countries deploying different governance structures for organising SOEs. A proposition was developed in line with dimensionalisation to assess the organising models. The proposition is that SOEs organised using a bilateral governance structure are expected to perform better than those organised using a unified governance structure – since the attributes and characteristics of transactions/contracts are semi-strong in the bilateral structure, according to TCE. Findings appear to support the proposition, indicating that SOEs organised in a bilateral governance structure perform better relative to those that are organised under unified governance.

Keywords: *dimensionalisation, organising models, ownership models, state-owned enterprises, transaction cost economics (TCE)*

JEL: *L, M*

Introduction

Focusing on dynamic, complex, and interconnected settings today shows that inter- and intrafirm networks, in all its forms, are becoming more crucial for helping businesses improve coordination and innovation to obtain a competitive advantage (Yaqub et al. 2020, Koch and Windsperger 2017, Windsperger et al. 2019). Despite this clear benefit, networks are not without problems due to the abundance of role players in this organisational sector (such as public and private role players), particularly when it comes to public-private collaborations (Windsperger et al. 2019, Colasanti et al. 2019). In order to explain formal and informal governance structure issues (for the purposes of this study ownership, organising, incentives, and control) of these networks, new theoretical perspectives on designing intra- and interfirm network governance are required (Gibbons 2020a, 2020b, Grandori 2017). This study discusses and exhibits the application of TCE's dimensionalization in evaluating the governance structure of SOEs, a type of network, particularly if they are partially owned, as a contribution to this expanding subject (Adebayo and Ackers 2022, Musacchio et al. 2017).

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In this context, it has been shown that governance problems are the primary issue afflicting SOEs worldwide (Daiser et al. 2017). Since Aharoni (1981) reintroduced SOEs as socioeconomic policy tools, observers have been searching for solutions to the myriad corporate governance issues that SOEs face. The World Bank Framework on Corporate Governance of SOEs and the OECD (2005) Guidelines on Corporate Governance of SOEs appear to be the only two recognised frameworks to date for evaluating corporate governance in SOEs. Over the years, these frameworks have helped interested SOEs engage in excellent corporate governance practises. The way of owning and governing SOEs is one of the identified strong corporate governance practises that are incorporated into these frameworks. Hence there is a need for tools that can be used to examine these practises. This paper bridges this gap.

There have been continuous discussions over the effectiveness of various ownership and governance arrangements that apply to SOEs (Bird 2020, Hafsi 2020, McDonald 2020, World Bank 2014, OECD 2005). The decentralised, centralised, dual, and holding company models of governance structure are the available governance structure models. Traditional ownership types include decentralised, centralised, and dual structures, whereas the holding company model is more recent. Top countries that use these methods to organise SOEs must be chosen in order to compare these governance structure models utilising dimensional analysis through their SOEs. Thus, this paper assesses the governance structures of SOEs in South Africa, a top country utilising the decentralised, centralised and dual models (USA 2020, World Bank 2014) and Singapore, a top country utilising the holding company model (OECD 2005). By contrasting the organisational structures of SOEs in South Africa and Singapore, this research aims to show how dimensionalisation – while established in the private sector – is also useful to evaluating governance structures in the public sphere.

Research on corporate governance has been conducted in a variety of ways and on a variety of issues (Hafsi 2020, Willner and Grönblom 2020, Aguilera and Crespi-Cladera 2016) and spans a wide range of disciplines (Papenfuß 2020, Okhmatovskiy et al. 2021). The Singapore Code of Corporate Governance's definition of corporate governance demonstrates the subject's multifaceted nature. It highlights how crucial structure is as a part of the corporate governance process (Singapore 2018). People and procedures are essentially internal factors in this setting, whereas structure includes both internal and exterior components. The two most significant external structural aspects of corporate governance of SOEs appear to be ownership and organising methods. Good corporate governance procedures of SOEs are said to depend on their ownership and organisational structures (World Bank 2014). As a result, to correctly structure SOEs to carry out their missions, an understanding of ownership and organisational models is essential.

Even before the recent COVID19 Pandemic, which seems to have crippled most economies, particularly developing economies, hurting the provision of public goods and services, SOEs in the majority of countries typically require state bailouts due to their inefficiency and ineffectiveness (Bird 2020). Ironically, because of their socioeconomic relevance, the number of SOEs continues to rise

globally despite their inefficiency and ineffectiveness (Cardinale 2020, Grossi et al. 2015). Since most SOEs are significant and frequently operate in vital state sectors (PwC 2015, Stan et al. 2014), owning states are frequently willing to step in and help SOEs in need. The majority of public sector employees are employed by SOEs and other organisations outside of the core central government (Rentsch and Finger 2015). Additionally, SOEs manage approximately 75 percent of the value of public sector investments, with a debt-to-equity ratio that is frequently higher than that of the central government (Bernier et al. 2020, Del Bo et al. 2017, Grossi et al. 2015). Additionally, SOEs in many nations use a sizable portion of the national resources of their owning nations, either increasing or depleting these resources. As a result, their effectiveness and efficiency play a significant role in determining the economic performance and competitiveness of the states they belong to (Kloviene and Gimzauskiene 2016, Grossi et al. 2015). Owning states, observers, and society as a whole cannot ignore these state enterprises in light of their importance, which has already been established.

Informed by the above, this paper makes four contributions. The first situates SOEs as networks and demonstrates the applicability of TCE to SOEs. The second demonstrates how dimensinalisation works in TCE by applying it to the organising models of SOEs in Singapore and South Africa. The third highlights the critical dimensions by which governance structures are analysed in relation to the attributes and characteristics of transactions/contracts useful for reforming organisations and establishing new organisations. The fourth expands the discourse on public entrepreneurship by opening up new debates and research areas on networks, governance, and corporate governance of SOEs.

Following the introduction, this paper proceeds by presenting TCE in the context of its applicability to public enterprises, as background. Thereafter it briefly reviews TCE, before describing dimenensionalisation. Following these, this paper demonstrates the applicability of dimensinalisation by assessing the organising models of SOEs in South Africa and Singapore. This paper then concludes by discussing its implications for theory, policy, and practice and providing avenues for further research.

Background

> The transaction cost approach to the study of economic organisation regards the transaction as the basic unit of analysis and holds that an understanding of transaction cost economising is central to the study of organisations. Applications of this approach require that transactions be dimensionalised and that alternative governance structures be described. Economising is accomplished by assigning transactions to governance structures in a discriminating way. The approach applies both to the determination of efficient boundaries, as between firms and markets, and to the organisation of internal transactions, including the design of employment relations …..… The approach has been applied at three levels of analysis. The first is the overall structure of the enterprise. This takes the scope of the enterprise as given and asks how the operating parts should be related to one another. Unitary, holding

> company, and multidivisional forms come under scrutiny when these issues are addressed (Williamson 1981, pp. 548–549).

TCE's dimensionalisation is a comparative analysis tool applicable to organising structures. Ménard (2021) notes that the most important contribution of TCE is the provision of conceptual tools for identifying and exploring the variety of forms that the organisation of transactions may take, going far beyond markets and the price mechanism. Hence, TCE is useful in assessing different forms of organising, and ownership models for structuring new organisations or reforming existing ones. The importance of TCE to organisational analysis is sustained since governance is a central theme and may be considered as a grand theme in contemporary socioeconomic organisation and management theory (Grandori 2017). Thus, it is a critical theme in the study of organisations.

Dimensionalisation in TCE, a comparative assessment tool, is a useful tool for assessing governance structures generally and applicable to SOEs. In a dimensional analysis, one form of organising or contracting is compared with another form (Williamson 1985). In this way, in using the dimensional approach for assessing governance structures in SOEs, it is important to understand the dimension of transactions and/or contracts in which these enterprises are usually involved. This is also essential in understanding the variations between simple and complex contracts. In this context, Williamson (2005) submits that transactions differ according to the attributes of uncertainty, frequency, and the degree of asset specificity.

Many observers have questioned the relevance of these attributes to public management, citing that they were developed in the context of private sector enterprises (PSEs) (Dagdeviren and Robertson 2016, Ruiter 2005). Some of these authors have argued that probity, low-powered incentives, and protective employment relations should be analysed instead of the above attributes (Dagdeviren and Robertson 2016, Ruiter 2005). Others have argued that these attributes can be applied with modification (Brown and Potoski 2003) as opposing authors have argued against the relevance of TCE in the context of core public service provision, which differs from public enterprises. In this instance, as a way of modifying the attributes for the purposes of analysing governance structures in SOEs, it is better to discuss these attributes from the angle of the transactions and/or contracts to which SOEs are subjected, which is in line with public ordering (Williamson 2009), rather than from the angle of seller–buyer relations as in private ordering. In this way, uncertainty is concerned with the limited ability of enterprise to fully ascertain environmental and behavioural issues in unforeseen circumstances. It is accepted that their occurrence and significance are intermediate compared to frequency and asset specificity, with uncertainty in organisations being either high or intermediate. While the frequency dimension is strictly concerned with buyer activity in PSE settings, for the purposes of this study it is concerned with the frequency with which the transactions that are necessary for delivering SOEs' mandate recur, which in turn has a bearing on the volume of contracts entered and the level of uncertainty. The investment dimension in terms of asset specificity is a supplier activity within PSEs; as such, the degree to which organisations invest in

specialised assets is also relevant to SOEs without modification, since SOEs are taken as suppliers of public goods where relevant (Williamson 1999).

Transaction Cost Economics

Transaction cost economics (TCE) came into existence in 1937 in the work of Coase on 'The nature of the firm' (Coase 1937). Coase (1937) argues that firms arise as a result of the quest for a reduction in transaction costs (TCs) (Ketokivi and Mahoney 2017). TCE is an interdisciplinary approach to the study of organisations that encompasses economics, organisation theory, as well as aspects of contract law (Williamson 1981). The idea is that if the costs associated with organising transactions within the market are exorbitant, then these transactions can be organised within the firm in order to gain behavioural, social, and economic benefits (Vining and Laurin 2020, Jones and Hill 1988). Thus, TCs entail costs that are associated with running an economic system (Arrow 1969). Put differently, TCs are costs associated with negotiating, monitoring, and enforcing exchanges between two or more parties (Jones and Hill 1988). Since TCs are associated with running an economic system, it therefore follows that the main focus of TCE is on a firm's efficiency (De Schepper et al. 2015). This is because TCE views the organisational problem as that of contracting (Williamson 1985). Along these lines, the problem is posed as the accomplishment of a particular task that can be carried out using different modes of organising. The issue that then arises is estimating the likely cost of each organising form. Hence, a point of departure for TCE from traditional economic analysis is that the unit of analysis in TCE is the organisation itself, and not the commodity traded by the organisation. Hence, TCE regards the firm not as a production function but as a governance structure necessary to govern a series of contracts (Williamson 1998). In this way, the focus is usually on assessing the ability of different governance structures, firms, markets, hybrids, and others to minimise TCs (in the case of SOEs, the cost of gathering information about private role players; the cost of political interference; the cost of corruption; the cost of socioeconomic development; the cost of private goods to citizens; government taxation; the cost of soft-budget constraints; the cost of free-rider and the cost of conflicting objectives) (Williamson 1981). This is done in order to determine efficient boundaries in a continuum of governance structures that starts with the market and ends with firms (Williamson 1981). This implies that organisational forms matter (Williamson 1985), following Commons's (1932) observation that governance is the means through which order is infused as a way of mitigating conflicts to realise mutual gains. As such, governance structures should be aligned to the specific needs of each type of transaction (Williamson 1981).

There are variants of TCs. Williamson (1981) recognised two types of TCs, ex-ante and ex-post. Ex-ante TCs emanate from efforts in the pre-contract and contract phases to prevent the failure of a transaction as regards asset specificity, and when opportunism (individuals' propensity to cheat and lie) meets the absence of alternative exchange partners. Ex-post costs, on the other hand, are the post-

contract phase costs related to adjusting contracts. Consequently, it becomes clear that TCE combines issues of incomplete contracting, holdup problems, bounded rationality, and opportunistic behaviour in explaining the existence of firms (Hart 1995, Kállay 2012). In this way, these ex-ante costs are the costs of setting up contracts (drafting, negotiating, and protecting agreements) and governance structures. The costs of altering contracts and of monitoring and evaluating contracts, especially as a result of errors, omissions, and unforeseen disturbances, are ex-post costs that add up to the normal production costs, thereby resulting in market failure owing to the additional costs of goods or services, that is, the cost of running an economic system (Boston et al. 1996). Market failures also occur when rationally bounded individuals are confronted by ex-ante heightened complexity and uncertainty. Jones and Hill (1988) classified these issues into six categories: bounded rationality, opportunism, uncertainty and complexity, a few trading relationships, information asymmetry, and asset specificity. These factors, taken as a whole, cause specific transaction issues (Jones and Hill 1988).

The close examination of ex-ante and ex-post costs described above indicates that these costs are difficult to quantify. One way of curtailing this is by a comparative institutional analysis. Williamson (1981) referred to this as 'dimensionalising transactions'. In a comparative institutional analysis through dimensionalising transactions, a form of organising or contracting is compared with another form of contracting or organising (Williamson 1985). Williamson (1985) contends that although TCE understands the importance of ownership and technology, ownership and technology alone do not determine economic organisation. Hence, the study of economic organisation must encompass an investigation of incentives and governance. This is because when a transaction is removed from market mechanisms and organised by a firm, three events occur: ownership changes, incentive changes, and governance structure also changes.

TCE is important for organisational studies because of asset specificity, information asymmetry, formal and informal governance apparatus, uncertainty, and incentives. TCE is very important for public sector analysis because the public sector is characterised by a great deal of uncertainty (Subramanian 2015, Aharoni 1981). Along these lines, Williamson (1981) observes that the TCE approach to organisational studies can be applied at three analysis levels: the overall enterprise structure, the operating parts, and the manner in which human assets are organised. Further, in this context, Arrow (1969, p. 2) contends that:

> The identification of transaction costs in different contexts and under different systems of resource allocation should be a major item on the research agenda of the theory of public goods and indeed of the theory of resource allocation in general. The 'exclusion principle' is a limiting case of one kind of transaction cost, but another type, the costliness of the information needed to enter and participate in any market, has been little remarked. Information is closely related on the one hand to communication and on the other to uncertainty (Arrow 1969, p. 2).

The focus of the overall enterprise structure is on how to relate operating parts to one another. As such, when these issues are analysed, multidivisional, unitary, and holding company forms are scrutinised. The main issue addressed by the operating

parts is the determination of efficient boundaries. Hence, this entails an analysis of the activities that should be performed within and outside the firm. The focus of the way human assets is organised is to align internal governance structures with the personal aspirations of work groups within a firm. In a particular analysis, it may be difficult to separate the first two levels, the overall enterprise structure and the operating part. This is because they inform each other. The determination of an efficient boundary informs the organising structure and vice versa. Further, when considering the role of incentives in aligning internal governance structures with the goals of work groups, it may also be argued that the three levels are inseparable. This is because superior performance entails the establishment of an ideal fit between strategy and structure (Jones and Hill 1988).

The main early application of TCE was to demonstrate that not everything can be organised within the market (Chang 2007). However, just as there are benefits associated with internalising transactions, there are also associated costs. It was as a result of these bureaucratic costs that the agency theory approach emerged (Jones and Hill 1988). Agency theory advocates that internalising transactions rather than letting the market control these transactions does not simply eradicate TCs. This is because there are certain conditions, such as managers' propensity to cheat and lie, just as in market transactions, that cannot be guaranteed maximally. In linking these arguments to SOEs, it can be argued that SOEs exist to economise on TCs (Peng et al. 2016), in addition to correcting market failure, as well as the other arguments in support of SOEs. In this context, Farazmand (2012) observes that TCs provide an economic stance on the idea of "big is beautiful" if big government is efficient and able to limit TCs. The idea here is that states can do other things apart from providing public goods if TCs are low. However, in economising on TCs, SOEs must consider that TCs can only be economised to the extent that a particular SOE is not too big, as transactions thereby become too large, and it becomes difficult to contain costs. As in PSEs, there is a boundary at which the transactions carried out will be like if they were carried out in the market. In this case, bureaucratic costs will rise compared to when there are a smaller number of transactions. Thus, even though the initial idea of TCE was based on a comparison between the market and the firm as a single entity, TCE has been extended to compare different organising models under the firm approach.

Dimensionalising Transactions

Recall from earlier discussion at the introductory stage that transactions differ according to the attributes of uncertainty, frequency, and the degree of asset specificity (Williamson 2005). Even though of these three attributes, it appears that uncertainty and frequency are the key attributes in determining suitable governance structures, Williamson (1999) and Perrow (1986) have argued that it is the degree of investment that matters most. Thus, considerable emphasis when undertaking a study of governance falls on investment differences, which are more often related to the frequency of transactions than to the level of uncertainty. In summary, there is a relationship between asset specificity, uncertainty, and

transaction frequency (Williamson 1979). Asset specificity is basically concerned with the degree to which an asset that is used to support a transaction can be redeployed for alternative uses and users without loss of productive value (Flingstein and Feeland 1995, Perrow 1986). This understanding is in line with the notion that highly specific investments give rise to a condition of bilateral dependency, where parties to a transaction/ contract make substantial commitments in the form of investment in support of each other. Although it is the degree of investment that matters most, uncertainty and frequency are also relevant. Accordingly, uncertainty presents the need for adaptation in situations of bilateral dependency and where there is incomplete contracting that leads to the problem of maladaptation (see below) (Williamson 1979). Further, frequency is also a relevant dimension in that recurrent transactions normally support the setup costs of specialised governance, hence, possessing features of better reputation effect.

In operationalising uncertainty, high and intermediate variables are used (Williamson 1979). Non-specific, mixed and idiosyncratic investments are used in operationalising the degree of investment and transaction frequency is varied as one-time, occasional and recurrent (Williamson 1979). Non-specific investments involve purchasing the standard equipment or materials necessary for delivering mandates. Mixed investments involve the purchase of customised equipment and materials, whereas idiosyncratic investments are those that are highly specific in the sense that they cannot be easily used for transactions other than the one for which they were purchased without losing a significant portion of the investment made on them (Williamson 1979). These investments involve constructing a plant and/or site-specific transfer of intermediate product/machinery across successive stages or delivery areas. One-time transactions are often on-the-spot transactions and are not usually relevant in determining transaction frequency. Hence, occasional and recurrent transactions are relevant in this context. Occasional transactions are those transactions that involve purchasing standard and customised equipment as well as constructing a plant, while recurrent transactions are those concerned with purchasing standard and customised material for producing a component as well as site-specific transactions (Williamson 1979).

Since it has been established that it is the degree of investment in assets that matters the most, it follows that an important aspect of tracking operating efficiency is tracking the way in which enterprises utilise their assets. In this way, property, plant, and equipment in conjunction with working capital (inventories, trade receivables, and payables) become important elements in tracking operational efficiency. The inclusion of working capital takes into account the operating capital employed in relation to revenue. This shows how efficiently and effectively enterprises utilise their property, plant and equipment and working capital. In this way, ascertaining the asset turnover by taking into account property, plant, and equipment only presents a good picture of an enterprise's operations. While most authors use profit before tax, interest and total assets in order to obtain asset turnover, McKenzie (2014) submits that revenue in relation to operating capital employed (property, plant, and equipment as well as working capital) should be used in obtaining operational efficiency (asset turnover). McKenzie's (2014) assertion appears appropriate as the elements used can be further analysed into the

operational parts of property, plant, and equipment or fixed asset turnover, and the working capital ratio. In confirming McKenzie's (2014) stance, Esplin et al. (2014) assert that separating financial information into operating and financing activities is useful since operating activities mainly drive firm value. Taken together, property, plant, and equipment or fixed asset turnover, as well as asset turnover, which takes into account working capital, are useful elements for comparing the efficiency of an investment in assets necessary to deliver on a mandate. Since some SOEs are not expected to be profit-making, these fixed assets and asset turnover are only useful in detailing the operational efficiency and effectiveness of these enterprises, and they are equally important for firms in capital-intensive sectors (Bansal 2014). These measures are a subcategory of profitability ratios and are most useful when comparing enterprises' past performance or enterprises within the same industry (The Risk Management Association 2014, Bashir et al. 2013) since they are free from the effects of financing and taxation (Beyer and Hinke 2018). In this regard, since the use of assets differs between industries, operational efficiency and asset turnover differ substantially across various industries (The Risk Management Association 2014). Thus, the operational efficiency and asset turnover of manufacturing sector is expected to be considerably lower than that of the service, financial, and wholesale sectors since manufacturing sectors are usually asset-heavy (The Risk Management Association 2014). The basic rule is that the higher the turnover, the better (Bansal 2014). However, the Risk Management Association (2014) has noted that when these are abnormally high, three events are likely to be taking place. The first is that the company may need additional assets in order to deliver its mandate. The second reason is linked to assets depreciating faster compared to the industry average, while the third is because the company uses an inventory accounting method in which inventory is understated in relation to the industry average. When results are abnormally high, it is mandatory to compare them with the industry average to uncover the likely reasons for such discrepancies. When comparing to the industry average, the basic rule is that a low turnover compared to the industry average means that assets aren't being used as well as they could be. On the other hand, an abnormally high turnover compared to the industry average could mean that something is wrong.

As a reminder, three governance structures may be distinguished according to the TCE, namely, markets, hybrids, and hierarchies (firms, bureaus). Consequently, the two relevant governance structures for our purposes in terms of SOEs are unified governance and bilateral governance. Since SOEs, are in most cases, publicly owned, market governance does not often apply to SOEs, with the exception that it is the more relevant governance structure for SOEs in the financial sector. An analysis of organisational structures must match the transaction attributes with the critical dimensions of analysing governance structures as well in order to determine the governance structures that are suitable for different kinds of transactions/ contracts. In this context, the market governance structure is characterised by strong incentives, weak administrative control, and a legal rule system that is suitably geared to autonomous adaptations but weakly geared to cooperative adaptations (see Table 1) and strong contract law (Williamson 1979). Unified governance is characterised by weak incentives, strong administrative control, weak autonomous

adaptation, strong cooperative adaptation, and strong contract law. Bilateral governance, which lies in the middle between markets and hierarchies, is characterised by a set of complementary attributes describing hybrids in that they possess semi-strong incentives, semi-strong administrative control, semi-strong autonomous and cooperative adaptations, as well as semi-strong contract law (Williamson 1991). Thus, it may be argued that the hybrid mode works well since it is a middle path. However, its efficacy depends on credible commitments and discipline on the part of the parties involved, as well as the level of information disclosure, sanctions and penalties for default, monitoring and verification mechanisms, and the capacity of the dispute settlement mechanism in place.

Table 1. *Transaction Cost Economics Framework*

		Investment Characteristics		
		Non-specific	**Mixed**	**Idiosyncratic**
Frequency	**Occasional**	Purchasing standard equipment	Purchasing customised equipment	Constructing a plant
	Recurrent	Purchasing standard material	Purchasing customised material	Site-specific transfer of intermediate product/plant/machinery across successive stages
Governance Structures Alignment	**Occasional and recurrent**	Market governance	Bilateral governance	Unified governance
			Relational Contracting	
Critical dimensions on which governance structures are analysed in relation to the attributes and characteristics of transactions/contracts	**Incentive intensity**	Strong	Semi-strong	Weak
	Administrative controls	Weak	Semi-strong	Strong
	Autonomous adaptation	Strong	Semi-strong	Weak
	Cooperative adaptation	Weak	Semi-strong	Strong
	Contract law	Strong	Semi-strong	Weak
	Information context	Strong	Semi-strong	Weak
	Decision-making context	Strong	Semi-strong	Weak
Governance Structures		Market	Hybrid	Hierarchy

Source: Authors' own compilation with insight from Williamson (1979).

While the critical dimensions of these different governance structures are self-explanatory, it is important to elaborate on the importance of contract law in relation to the governance structures, not only because it does not lend itself to self-explanation as do the other dimensions, but also because issues related to contracts are also important in public ordering, just as in private ordering (Williamson 1979). The contract law associated with markets is one based on legal rules, in which parties are more likely to go their separate ways after the court has pronounced in favour of one of the parties and in which the losing party is to pay

or has paid the necessary damages. Thus, participants in this case are usually not interested in continuing such transactions because of the arm's length nature of their dealings. The bilateral mode uses a framework as a form of contract. This framework encourages cooperation, within limits, because of its elasticity in relation to contracts. Transactions are organised under the unified mode when the limits under the hybrid mode are surpassed. Since hierarchy entails more internal organisation, there are usually few or no contractual dilemmas as compared to markets and hybrids. However, when there are internal disputes, the court may likely refuse to hear these disputes between parties in the same organisation; thus, the contract law under the unified mode is usually that of forbearance, in which the parties are inclined to settle disputes internally with less recourse to the court of law. Thus, contract law under unified governance is usually weak in terms of external assessment but strong in terms of internal workings and supports cooperative adaptations (Williamson 1991).

Another important dimension is adaptation. This adaptation entails the ability of organisations to adapt to or respond successfully and quickly to disturbances of all kinds, especially those that are as a result of business and environmental uncertainties. Autonomous adaptation involves spontaneous acts of individuals and/or organisations directed towards reducing the risk posed by resource scarcity as well as changes in prices as a result of fluctuations in demand and supply (Forsyth and Evans 2013). Cooperative adaptation, on the other hand, is a kind of intentional cooperation brought about by the conscious, deliberate, and purposeful coordination of organisations (Williamson 1993). These attributes and characteristics of transactions/contracts, governance structures and critical dimensions of analysis of governance structures vis-à-vis attributes and characteristics of transactions/ contracts are summarised in Table 1 above.

Demonstrating Dimensionalisation

To demonstrate dimensionalisation, two countries utilising different models for organising SOEs are used. In line with the ongoing debate on the efficacy of different governance structures noted earlier, theoretical sampling (Adebayo and Ackers 2021) was employed in selecting relevant countries using different models. The theoretical arguments that guided country selection are that SOEs should be organised in such a way that commercial objectives are separated from social objectives and, thus, these SOEs should not be organised under state ministries (see Keynes (1926) for this argument). Singapore, a country that uses the holding company model for organising (Huat 2016) SOEs, is a top country regarding this argument, thus selected. An opposing argument would be that SOEs should be organised under the state to provide a form of competition necessary to curtail the evils of private ownership (see Marx 1887 (1967) for this argument). South Africa is a top country (United States of America Department of State 2020) that uses the more traditional models – decentralised, centralised and dual – thus selected.

Although Singapore and South Africa are at different stages of economic development, they are both developing countries. In this regard, the United

Nations (UN) (2021), in its World Economic Situation and Prospects 2021 based on the report prepared by the Economic Analysis and Policy Division (EAPD) of the Department of Economic and Social Affairs of the United Nations Secretariat (UN/DESA) has categorised both countries as developing economies.

The grouping of SOEs in Singapore is used as it clearly groups SOEs relative to the grouping in South Africa. Thus, SOEs are grouped into Transportation and Industrials; Telecom, Media and Technology; Energy and Resources as well as Financial sectors. As a result of space limitation, relevant SOEs from only the first two sectors – Transportation and Industrials; and Telecom, Media and Technology – are employed in demonstrating dimensionalisation.

Investment Characteristics of State-Owned Enterprise Sectors

Investment Characteristics of the Transportation and Industrials Sector

Considering the discussion on governance structures as per TCE, Transportation and Industrials usually require substantial investments in physical assets (Williamson 1979). Substantial sunk investments are required in this sector. Sunk investments in this context are investments requiring large capital and/or costs (Cruz and Marques 2013), and whose recoup period spans over several years (Medda 2007), if at all recoverable. In addition, temporal specificity is also present in this sector, although more in industrials than in transportation. This is because sites often require the timely response of on-site human assets. Hence, human specificity is also key, as some aspects of operations require specific skills, especially in industrials, which operators acquire by performing such tasks. Most of the investments needed in this sector are highly specific in the form of site-specific transfer of intermediate product/plant/machinery across successive stages (Williamson 1979). In addition, substantial occasional investments, in the form of plant/track construction, are also required, especially in industrials and land transportation. This in effect means that, in this sector, transaction frequency is usually both occasional and recurrent, depending on the mandates of the enterprises (Williamson 1979). In this case, enterprises in this sector that fall under land transportation generally erect and maintain the track necessary for providing rail transportation, while those in sea transportation will have to erect and maintain loading and docking ports. The enterprises that fall under industrials will have to construct the plants required to operate, and some will also have to maintain different stations; thus, site-specificity becomes relevant as well. Furthermore, enterprises involved in air transportation will have to purchase customised equipment in the form of aircraft in order to operate. In this way, this sector also requires substantial sunk investments. Since specialised physical and human assets become more specialised for a single use and thus less transferrable to other purposes, there is no incentive for trading in such investments, unless on the proceeds that can accrue from these investments (Williamson 1979). Thus, the choice of governance structure is usually one with superior adaptive cooperative features. In addition, the critical dimensions to which governance structures are matched with attributes and transactions/contracts also matter in assessing

governance structures. In this sector, TCE favours bilateral governance (hybrid) for some SOEs, especially those involved in transportation, and unified governance (hierarchy) for others, especially those involved in industries, as is the case in the telecom, media, and technology sector discussed below. Enterprises for which unified governance is advanced by TCE require a great deal of strong administrative controls as well as cooperative adaptation. This will be at the expense of weak incentive intensity, autonomous adaptation, contract law, and information and decision-making contexts. However, bilateral governance cuts across market, and hierarchy, thus incentive intensity, autonomous adaptation, contract law, and information and decision-making contexts can be both semi-strong (if hybrid is favoured) or weak (if hierarchy is favoured). Accordingly, cooperative adaptation and administrative control can also be semi-strong (if hybrid is favoured) or strong (if hierarchy is favoured) (Williamson 1979).

Investment Characteristics of the Telecom, Media and Technology Sector

Considering the discussion on governance structure above, in the context of this study, the Telecom, Media and Technology sector generally requires substantial investments in specific physical assets in order to deliver on their mandates (Williamson 1979). Although the media does require substantial investment, it does not require the substantial investments in physical assets that telecom and technology require; rather, it often requires site-specific investments. In addition, temporal specificity is also present in telecom, media, and technology, in that sites often require the timely response of on-site human assets. It is thus clear that human specificity is also key, as some aspects of operations require specific skills which operators acquire by performing such tasks. Much of the investment needed in this sector is highly specific in the form of site-specific transfer of intermediate product/plant/ machinery across successive stages (Williamson 1979). Accordingly, enterprises in this sector usually erect the transmitters necessary for broadcast and service provision in terms of communication services. Since this sector requires such recurrent investment, the ideal governance structure is a relational contract in the form of unified governance (hierarchy). This is because specialised physical and human assets become more specialised for a single use, thus less transferrable to other purposes (Williamson 1979). In addition, in terms of disposal, there is no incentive for trading in such an investment, unless on the proceeds that may accrue from such an investment. Thus, the choice of governance structure is usually one with superior adaptive cooperative features. Hence, vertical integration, in which an enterprise owns the parties with which it transacts in terms of the components needed to deliver on its mandate, is usually necessary for those enterprises that fall under unified governance. This is essential because the firm does not have to enter into some form of incomplete contract that requires revision and consultation (Williamson 1999). Taken as a whole, since there is little incentive for trading, parties to such a transaction may be satisfied with whatever accrues from their relational dealings. In this context, telecommunications often requires substantial investments as well, as a result of erecting transmitting plants in several locations.

Table 2. *Analysis Based on TCE*

	Organised as per TCE		**Critical dimensions for analysing governance structure in relation to transactions according to the governance structure in use**						
Company	**Yes**	**No**	**Decision-making context**	**Incentive intensity**	**Administrative control**	**Autonomous adaptation**	**Cooperative adaptation**	**Contract law**	**Information context**
TELKOM SA		X	Semi-strong	Semi-strong	Semi-strong	Semi-strong	Semi-strong	Semi-strong	Semi-strong
SINGTEL		X	Semi-strong	Semi-strong	Semi-strong	Semi-strong	Semi-strong	Semi-strong	Semi-strong
PRASA	X		Weak	Weak	Strong	Weak	Strong	Weak	Weak
SMRT	X		Semi-strong	Semi-strong	Semi-strong	Semi-strong	Semi-strong	Semi-strong	Semi-strong

Source: Authors' own compilation with insights from Williamson (1979, 1991, 1993, 1998, 2005).

Dimensionalisation

Relevant SOEs, under the two groups above, in the two countries are matched together to facilitate a dimensional analysis. Since TCE argues that it is the degree of investment that matters, TCE favours different governance structures for different classes of transactions. In this context, the central argument in this study is that, in line with TCE, SOEs organised using a bilateral governance structure are expected to perform better than those organised using a unified governance structure – since the critical dimensions on which governance structures are analysed in relation to the attributes and characteristics of transactions/contracts will be semi-strong (Vining and Laurin 2020). It then becomes important to compare enterprises within these structures in order to establish which of the structures is ideal for governing SOEs (McDonald 2020). In this case, Munyo and Regent (2016) have confirmed that ownership and organising structure have an impact on enterprise performance. Further, Mbo and Adjasi (2017), in their study of drivers of organisational performance in SOEs, also confirmed that both ownership and board structure influence enterprise performance. Hence, a proposition in line with TCE's dimensionalistaion arguments guides this analysis. The proposition (***P***) is that SOEs that are organised through a holding company and through part ownership (a combination of public and private role players) are more likely to perform better relative to those that are fully owned and under the state's ministry or ministries.

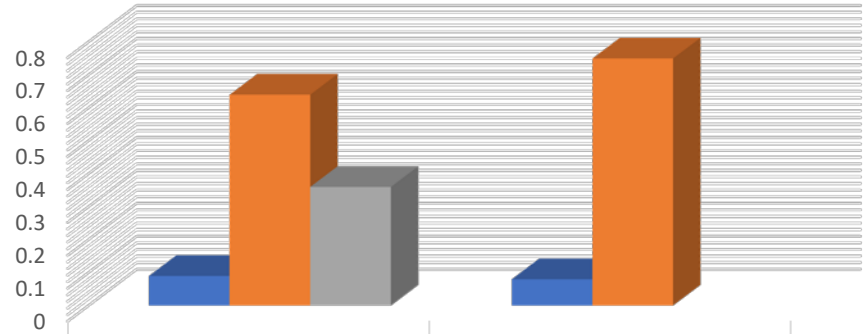
Since it has been established that it is the degree of investment in assets that matters most, it follows that an important aspect of tracking operating efficiency is tracking the way in which enterprises utilise their assets. In analysing these organisations, the annual reports of the SOEs were used. The data for computations was collected from the three years' annual reports of SOEs between 2016/17-2018/19 considering that a three-year period is enough to demonstrate dimensionalisation. The study used 2018/2019 as the apex year as this was the last period SMRT, one of the SOEs in the study's sample, published an annual report. SMRT has subsequently been publishing the SMRT Review, which does not contain financials. Thus, the same period was used for all SOEs in the sample. To determine the difference in performance of the different structures, the operational efficiency and the fixed asset turnover of these enterprises were computed as these are the relevant computations since it is the degree of investment that matters the most under TCE. Because the average three-year CSI Market industry average (CSI Market n.d.) was used for comparison purposes, only the operational efficiency was used in the analysis, as this is what is available based on the CSI Market's industry average computations.

Transportation and Industrials Sector

South Africa's PRASA and Singapore's SMRT were compared under the Transportation and Industrial sector. Both enterprises are appropriately structured according to TCE (Table 2). TCE argues that the governance structure ideal for enterprises involved in recurrent transactions of idiosyncratic asset specificity is a relational contract in the form of unified governance. PRASA is a schedule 3B

national government business enterprise (NGBE) wholly owned by the South African government through the Department of Transport. Its mandate is to deliver commuter rail services in the metropolitan areas of South Africa, as well as long-distance rail and bus services within, to and from the borders of the country. It is non-profit oriented, but it is expected that its revenue will cover expenses. In this regard, PRASA has been loss-making and often requires bailouts from the state. Transactions required to deliver on its mandates are recurrent in the form of the site-specific transfer of intermediate products or machinery across successive stages; there is mid-level uncertainty; and investments in specific assets are usually substantial and idiosyncratic. Decision-making context, information context, contract law, incentive intensity, and autonomous adaptation are usually weak, while administrative control and cooperative adaptation are usually strong (Table 2; Williamson 1979). With regard to SMRT, its mandate is similar to that of PRASA in that it is a premier multi-modal land transport provider involved in rail, bus, taxi, and automotive service operations. It is expected to operate profitably and thus operate like a private enterprise. In this context, SMRT has been operating profitably. Attributes are similar to PRASA in that the transactions required to deliver on its mandate are recurrent, with an intermediate level of uncertainty. Investments in specific assets are usually substantial and idiosyncratic (Williamson 1979). Since SMRT operates under a holding company structure, it is expected that incentive intensity, autonomous adaptation, contract law, information and decision-making context, autonomous adaptation, and administrative control will be semi-strong. Incentive intensity is stronger in SMRT compared with PRASA in that management and directors are better remunerated and are allowed share ownership as a way of aligning management's and shareholders' interests. As summarised in Figure 1, the operational efficiency of PRASA (0.09) in terms of asset turnover was lower than that of SMRT (0.64). SMRT's fixed asset turnover (0.75) was also higher than that of PRASA (0.08).

Figure 1. *Comparison of PRASA and SMRT (Content Analysis – Annual Reports)*



	Operational Efficiency	Fixed Asset Turn
PRASA	0.09	0.08
SMRT	0.64	0.75
Industry Average	0.36	

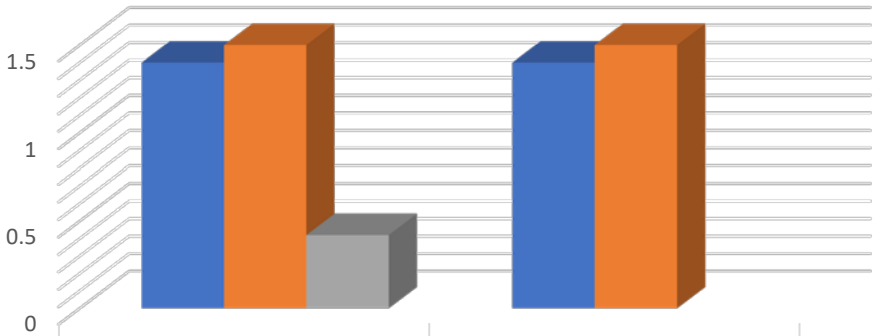
PRASA SMRT Industry Average

With regard to TCE, the ideal governance structure for enterprises involved in recurrent transactions of idiosyncratic asset specificity (PRASA, SMRT) is a relational contract in the form of unified governance. For enterprises where TCE supports unified governance, PRASA and SMRT were compared. Both enterprises are wholly owned by their various governments, thus appropriately structured according to TCE (Table 2). While SMRT falls under a holding company, PRASA falls under the decentralised structure under a state ministry. Pictured, in Figure 1, the operational efficiency of PRASA (0.09) was significantly lower than that of SMRT (0.64); also, the fixed asset turnover of both enterprises was in line with their operational efficiencies, with that of SMRT being higher than that of PRASA, thus appearing to confirm the proposition that SOEs that are organised through a holding company and through part ownership by public and private role players are more likely to perform better relative to those that are fully owned and under the state's ministry or ministries. Comparison with the industry average (0.36) also indicates that SMRT performed better, while the operational efficiency of PRASA was significantly lower.

Telecommunications, Media and Technology Sector

Telkom SA and Singapore Telecom (Singtel) were compared under the Telecommunications, Media, and Technology sector. These enterprises are both partly owned; thus, they are not appropriately structured according to TCE (Table 2). They are both profit-oriented and have both been profitable. The South African government, through the Department of Telecommunications and Postal Services and the PIC, owns about 51% of the shares in Telkom SA, while the Singaporean government, through Temasek and the CPF (managed by the GIC), has a 57.46% share in Singapore Telecom. These enterprises engage in recurrent transactions to discharge their duties. There is an intermediate level of uncertainty and investments in idiosyncratic assets. Incentive intensity, administrative controls, autonomous and cooperative adaptations, contract law, information context, and decision-making context are semi-strong (Table 2). Singapore Telecom directors are allowed company share ownership as a way of aligning directors' and shareholders' interests. Since Telkom SA is also listed on the JSE, Telkom SA's middle management and bargaining unit employees are permitted to purchase company shares through the employee share ownership plan on the open market, which is designed to motivate long-term sustainable performance and align the interests of management with those of the shareholders. The difference in incentives is that while the share plan for Singapore Telecom is for management and directors, certain qualifying Telkom SA employees are allowed share ownership. As illustrated in Figure 2, the operational efficiency of Telkom SA (1.4) in terms of asset turnover was slightly lower compared with that of Singapore Telecom (1.5). Singapore Telecom's fixed asset turnover (1.5) was also slightly higher than that of Telkom SA (1.4).

Figure 2. *Comparison of Telkom SA and Singapore Telecom (Content Analysis - Annual Reports)*



	Operational Efficiency	Fixed Asset Turn
Telkom SA	1.4	1.4
Singtel	1.5	1.5
Industry Average	0.42	

Telkom SA Singtel Industry Average

Following the arguments of TCE, in this sector, the hybrid structure (bilateral) is deemed better than the other structures considering that the critical dimensions against which governance structures are analysed in relation to attributes and characteristics are semi-strong, combining the strengths and weaknesses of the market and hierarchy governance structures. In this sector, TCE favours unified governance for enterprises involved in telecommunications and media, and bilateral governance for enterprises involved in technology. Thus, for enterprises involved in technology and media, the ideal governance structure would be the unified model in which the partly owned enterprises would be some sort of subsidiary needed for carrying out the activities of SOEs.

There was no observed significant difference between the operational efficiency of Telkom SA (1.4) and Singapore Telecom (1.5) (Figure 2). Compared with the industry average (0.42), both enterprises operated efficiently. Also, the fixed asset turnover of both enterprises was normal in relation to their operational efficiency. Since both enterprises are organised according to the proposition, the results appear to confirm the proposition when compared to the result under the Transportation and Industrials sector considering that both Singapore Telecom and Telkom SA have similar results since they are organised in a similar way in line with the proposition compared to PRASA and SMRT, with a notable difference in results, with SMRT organised in line with the proposition and PRASA is not.

Conclusion, Implications and Further Research

This paper has demonstrated dimensinalisation by comparing SOEs in Singapore and South Africa. In addition, the paper developed a TCE framework detailing different forms of organisation structures, investment characteristics, as

well as critical dimensions by which governance structures are analysed in relation to the attributes and characteristics of transactions/contracts. Thus, a particular important point, as seen in Table 1, about dimensionalisation in TCE, is that it makes clear the strength and weaknesses of each of the various forms of organisation structures, especially regarding the critical dimensions by which governance structures are analysed in relation to the attributes and characteristics of transactions/contracts. Dimensionalisation is very useful in determining structures for reforming not just PSEs and SOEs but as well as in establishing new organisations. This paper has shown that both TCE and TCE's dimensionalisation are useful organisational tools that can be applied to various organisational analysis at various levels.

Following from the above, this paper has implications for theory, policymakers, standard setters/regulators and practitioners involved in SOEs and public sector management. It further reinforces the importance of TCE as a theory and its relationship with other theories of the firm, especially the agency theory. The results of this paper will assist policymakers, standard setters/regulators and practitioners involved in SOEs and public sector management by improving their understanding of the impact of governance structures applicable to SOEs and other state agencies and their strengths and weaknesses. Therefore, this enables them to make informed decisions on how they could use a particular structure or a combination of structures to organise SOEs. Thus, they are to ensure that they come up with policies that will support utilising a good governance structure in structuring SOEs and other state agencies, which is key in mitigating fruitless and wasteful expenditure by SOEs and in increasing taxpayers' confidence in the ability of political agents to manage taxpayers' money effectively and efficiently. This paper, therefore, has important strategic and operational management implications that states and their entities, enterprises, and agencies should consider.

Like any study of this nature, there are bound to be limitations, providing avenues for further research. In this regard, it is clear from the above discussion and analysis that TCE may be applied in a number of different ways to analyse socioeconomic organisations, especially with regards to structure – ownership, and organising. This study has only described the process of dimensionalising as applicable to SOEs. Future studies could explore further ways in which dimensionalistion could be used for analysis in organisational studies aside from the one described in this study. Such studies could explore other aspects of TCE not considered in this study. Future studies could also explore in detail the characteristics of other SOE sectors not considered in this paper as a result of space limitation. Further, future studies could also explore other aspects of TCE related to technology as observed in the above discussion. Future research could also extend this study by using a large dataset to explore dimensionalisation. Using a large dataset may also allow for quantitative analysis of observations, taking the elements of operational efficiency as variables. It is also possible to extend dimensinalisation to other organisations, such as non-profit organisations.

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