TRANSPORT & *LOGISTICS:*
the International Journal

Article history:
Received 28th July 2022
Accepted 18th November 2022
Available online 25th November 2022

ISSN 2406-1069

Article citation info: Chiparo, J. P., Tukuta, M., Musanzikwa, M., Vehicle maintenance and services delivery within state-owned enterprises (SOEs in Zimbabwe). Transport and Logistics: the International Journal, 2022; Volume 22, Issue 53, November 2022, ISSN 2406-1069

VEHICLE MAINTENANCE AND SERVICES DELIVERY WITHIN STATE-OWNED ENTERPRISES (SOEs IN ZIMBABWE)

John Promise Chiparo [1], Marian Tukuta [2], Michael Musanzikwa [3]

[1] Department of Logistics and Transport, Zimbabwe Electricity Supply Authority Head Office, Harare, Zimbabwe, +263772918728, chiparojp@gmail.com

[2] Department of Supply Chain Management, Chinhoyi University of Technology, Off Chirundu Road, Chinhoyi, Zimbabwe, +263774034657, mtukuta@cut.ac.zw

[3] Department of Corporate Government Unit, State Enterprise, Reform and Procurement, Corner Kwame/Third Street, Zimbabwe, +2630782742547, *michaelmusanzikwa@yahoo.co.uk.*

Abstract:
The study sought to establish the effect of vehicle maintenance on service delivery within State-Owned Enterprises, (SOEs). The study used a mixed-method research strategy and a pragmatic research philosophy. In addition, 344 respondents from 86 SOEs were given standardized questionnaires to complete. The researchers employed stratified and purposive sampling. Statistical package for social scientists (SPSS) version 20 was used to generate descriptive statistics. All study items were subjected to exploratory factor analysis (EFA), and research hypotheses were assessed using Structural Equation Modelling (SEM) in AMOS version 21. The study established that there is sufficient evidence for the effect of vehicle maintenance on service delivery. It is evident from the results that vehicles are not regularly serviced, genuine spare parts ordered are not properly tracked to the intended vehicles, there is vehicle parts cannibalisation and that vehicle faulty components are not replaced until failure occurs. The study recommended that there is need to consider preventive maintenance as a way to reduce vehicle breakdowns and improve the lifecycles of vehicles. In addition, SOEs should strive to deal with accredited vehicle dealers in order to reduce the possibility of using counterfeit spare parts.

Key words:
Fleet Management, Maintenance, Repair, Service delivery

1 INTRODUCTION

Most State-Owned Enterprises (SOEs) globally, are faced with shrinking budget facilities while at the same time having to provide the most suitable fleet in support of their core business for service delivery requirements (Rahim et al, 2021). In the same way, Bhattacharjee et al, (2019) reiterated that the limited budget is worsening with the increasing demand for the availability of high performance and quality public services. Azwitamisi and Ngwakwe, (2021) assert that one way of improving service delivery is to ensure that public asset management is prioritised. Correspondingly, Manyathi et al, (2021) reported that with the modernisation of the public sector under the New Public Management (NPM) in the United Kingdom, the improved asset management has resulted in better service delivery. In the same way, Milakovich et al, (2021) observed that effective vehicle fleet management could improve service delivery through reduced downtimes, reduced repair and maintenance costs and reduced accidents. Frankema et al, (2019) assert that most SOEs in Africa are a fiscal burden as they continue to depend heavily on state subsidies to operate. Waldt, (2017) posits that most SOEs in Africa are no longer able to satisfy the various demands of their customers effectively in terms of reaction speed, delivery policy, information services and flexibility.

In addition, Sun et al, (2019) pointed out that SOEs lack the ability to track and control the movement of vehicles and lose hundreds of dollars as regards poor vehicle maintenance. On the other hand, Gudelis and Guogis (2011) observed that fleet management practices in public entities in Tanzania have not been immune to fleet losses, breakdowns, accidents, unreliability, imprudent vehicle acquisition and disposal. Ampiah, (2018) revealed that public entities in Ghana are challenged by frequent vehicle breakdowns, accidents and poor vehicle scheduling. Priya et al, (2019), Rossouw and Weyer (2019) suggest that there is a need to enforce strict policies and regulations to encourage effective fleet management practices and improved service delivery. However, this is not the case in other developing countries such as European Union (EU) where regulatory support has helped public entities in developing efficient fleet management practices, (Rhode, 2019). Aflabo, Kraa and Agbenyo (2020), pointed out that vehicle fleet management practices such as repair and maintenance, fuel and driver management, and training have the potential to influence organisational competitiveness. In the same way, Gitahi and Ogollah (2014), reiterated that vehicle fleet management practices positively influence service delivery. Despite this impact, there is limited empirical evidence on the influence of vehicle fleet management practices on service delivery within SOEs in developing parts of the world, particularly in Africa.

In Zimbabwe, SOEs are seen as important socioeconomic enhancers in sectors where the private sector is hesitant to participate owing to a lack of funds, a paucity of capital, and a fear of excessive risk, (Hadebe et al, 2015). In Zimbabwe, SOEs play an important role in the economy since they can contribute around 42% of gross domeestic product (GDP), as well as a considerable part of domestic capital formation, industrial investment, and job creation. Mutanda (2014), Rusvingo, (2014) and Zvavahera (2014) noted that SOEs suffer from terrible mismanagement, inefficient use of productive capital, corruption, decrepit assets, a shortage of credit lines, and a debt overhang, regardless of their contribution to economic progress and prosperity. Likewise, Mudyazhezha and Mudyazhezha (2020) opine that the service delivery woes facing SOEs are related to poor asset management which involves a lack of accountability and failure to adhere to asset maintenance requirements. For instance, the National Railways of Zimbabwe (NRZ) is a pale shadow of its former self currently operating below 10% capacity utilisation. The Government of Zimbabwe (2020) observed that rolling stock also suffers from low availability and utilisation resulting in NRZ not being able to meet the current demand for freight services. The Cold Storage Commission (CSC) is now running

at less than 5% capacity in Bulawayo, following the closure of units in Masvingo, Chinhoyi, Kadoma, and Marondera.

Furthermore, the Zimbabwe Electricity Supply Authority (ZESA) is unable to provide sufficient electricity for both home and industrial consumers. Furthermore, according to the Parliamentary Committee on Transport and Infrastructure Development (2016), Air Zimbabwe has just five operational planes and roughly 50 pilots who take turns flying them. The Committee also found that a single plane requires roughly 300 engineers to service. Air Zimbabwe lacks the financial means to replace its aging aircraft, which is now over 20 years old and, by aviation standards, should be retired and converted to cargo transport. This demonstrates that service delivery in SOEs falls well short of what the economy and the citizens demands (Shoko et al, 2020). The fleet management function in Zimbabwean SOEs remains under pressure to achieve financial savings through efficient and coordinated service delivery. Vehicle maintenance in Zimbabwean SOEs remains a challenge in ensuring value for money and providing a superior service level. Reports indicate increasing costs in vehicle maintenance, fuel theft, aging fleet, poor vehicle financing, disposal and rampant misuse of state vehicles (Auditor-General Report, 2018). These malpractices have prompted most SOEs to make reforms in assets acquisition and disposal, use of logbooks and vehicle tracking systems. However, these efforts have failed to achieve desired results due to lack of professionalism in public assets procurement and disposal management as well as lack of financial acumen to fully adopt information communication technology in fleet management. Interestingly, Zimbabwe has legislative for compulsory technical inspections of any motor vehicle as provided by the Road Motor Transportation Act [Chapter 13:15]. This Act provides Commissioners who among others have powers to instruct an inspecting officer to examine any vehicle and to report to him on its condition and suitability for the conveyance of particular goods or passengers. This is a subject for research to analyse why this should continue negatively impacting on fleet management and service delivery within Stae-owned enterprises in Zimbabwe. Nonetheless, if the current failure in dealing with vehicle fleet management continues, service delivery in these institutions will be seriously compromised.

2 LITERATURE REVIEW

Literature review and development of hypothesis are presented in this section.

2.1 Vehicle maintenance

Vehicle maintenance captures issues such as the use of defective or low, quality spare parts, fitting a new part, replacement of a damaged component and changing the oil (Herman, 2010; Ampiah, 2018). Changing oil and filters is one of the most common maintenance requirements that affect vehicle performance (Aflabo et al, 2020). By the same token, Dönmez and Zemmouri (2016) and Ma et al (2017) assert that regularly scheduled oil change improves engine operations and ensures consistent uptime throughout the vehicle life span. Vehicle maintenance strategies are divided into three categories namely predictive maintenance, corrective (reactive - breakdown remedial maintenance), and preventative maintenance (Howell and Alshakhshir, 2020). In this study, vehicle maintenance focuses on any sort of motor vehicle servicing, repair, or maintenance, including but not limited to vehicle rehabilitation, mechanical repairs, painting, and lubrication.

2.2 Service delivery

Tu et al., (2021) define service delivery as a combined human and mechanical effort centred on people or things. Service delivery is the ultimate purpose of all governments across

the world, particularly democratic ones. Osborne (2020) describes public service delivery generally as an all-encompassing action aimed at enhancing the overall welfare of the community. Wollmann et al., (2020) posit that service delivery is part of a complex relationship between citizens and the government. According to Osborne (2020), individuals are getting impatient and dissatisfied with the perceived sluggish pace of service delivery. In this study, service delivery refers to the process of providing a service to customers or the internal clients of an organization. Different approaches have been used to assess the quality of service delivery. For instance, the SERVQUAL model which was developed by Zeithaml, Parasuraman, and Berry (1985) is the most well-known and commonly used tool for assessing quality service delivery. It was designed to assess ten dimensions of service quality: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, customer comprehension or knowledge, and tangibles. By the early 1990s scholars had refined the model with five dimensions namely reliability, assurance, tangibles, empathy, and responsiveness (Wal, Pampallis, and Bond, 2002). In this study, these dimensions were used to measure service delivery.

2.3 Hypothesis Development

Studies by Zacharof and Fontaras (2016) and Fontaras et al., (2017) have observed that when vehicles are properly maintained and repaired, vehicle fuel consumption improves. A majority of public sector organisations in some developed countries have realise the importance of vehicle maintenance and have included it in the general scheme of their organisations while those in developing countries are still struggling to incorporate vehicle maintenance in their business models, (Giglio et al., 2018). Lu (2017) emphasises that vehicle maintenance should be developed as a different function which contributes to the delivery of quality public services. For instance, Salonen and Deleryd (2011) observed that the cost of vehicle maintenance in public sector organisation in Sweden has been estimated to be close to 200 billion krona (SEK) per year with almost 33% of this cost spent unnecessarily on bad planning, overtime costs and bad use of preventive maintenance among others. Chiparo et al., (2022) noted that improper vehicle repair and maintenance systems and excessive use of reactive maintenance cost public entities a lot of money in terms of operation, downtime and, poor quality of service delivery. Scholars such as Gitahi and Ogollah (2014) have asserted that inventory for vehicle spare parts management has the potential to impact vehicle availability, reliability, and responsiveness, as well as the quality of services provided. According to Hu et al., (2018), the availability of spare parts mitigates the impacts of vehicle downtime. In the same way, Manzini et al. (2017) noted that the non-availability of replacement parts, when needed for repairs in most public institutions, leads to significant financial loss and poor public service delivery. As a result, spare parts management is critical to guaranteeing the necessary asset availability (Zhang et al., 2021). A good spare parts policy should specify how to cope with a probable failure of the operation (Kian et al., 2019). However, Diaz et al. (2019) discovered that the availability of spare parts in public organisations is complex, implying that vehicle downtime is significant. Zhang et al., (2021) discovered that appropriate spare component management ensures good dependability, responsiveness, and vehicle availability. There it is posited that:

H_1: Vehicle maintenance has a positive effect on service delivery

3 METHODS AND METHODOLOGY

A pragmatism research philosophy was used in the study because it gave researchers the flexibility to use the best ways to perform the research in order to collect more trustworthy data. Pragmatism research philosophy helps researchers to evaluate the problem from several perspectives and build a practical approach to study (Creswell, 2014). In addition, a mixed techniques strategy was used as it supports the pragmatism research philosophy. According to Bryman and Bell (2011), a mixed method strategy is a result of the pragmatist philosophy, which combines both qualitative and quantitative strategies at different stages of the research process. A cross-sectional survey was used because it provides precise results, good statistical significance, high representativeness, convenient data gathering and little observer subjectivity. The target population was comprised of 107 SOEs in Zimbabwe (Ministry of Finance and Economic Development, 2021). The sample size was of 86 SOEs was obtained using Krejcie and Morgan's (1970). Each SOE was given four questionnaires giving a grand total of 344 structured questionnaires. Structured questionnaires were distributed to Directors, Transport Managers, Transport Officers, Fuel Attendants, Drivers, and Mechanics. The study used stratified, convenience and purposive sampling. The researchers used stratified sampling to successfully divide the target population into homogeneous groups so that all elements of the population are well represented in the sample. Purposive sampling was also utilized to choose 25 key informants, including directors and transport managers. All items were measured on a five-point Likert scale (5-Strongly Agree, 4-Agree, 3-Not sure, 2-Disagree and 1-Strongly Disagree). All study items were subjected to exploratory factor analysis (EFA), and research hypotheses were tested using Structural Equation Modelling (SEM) in AMOS version 21.

4 RESULTS

Before performing EFA, the sustainability of the data for factor analysis was performed using Kaiser Meyer Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity in SPSS version 21. Results for the tests are presented on Table 1.

Tab.1: *KMO and Bartlett's Test*

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.606
Bartlett's Test of Sphericity	Approx. Chi-Square	851.925
	Df	435
	Sig.	.000

Source: Survey Data (2021)

A KMO statistic of 0.606, a chi-square of 851.925 and degrees of freedom [DF] of 435; $p<0.001$) were obtained indicating that the sample was adequate and suitable to perform exploratory factor analysis (EFA) as recommended by Field (2009). The KMO and Bartlett's Test of Sphericity were chosen because they are well-suited to testing sample adequacy and allowing for exploratory factor analysis (Ragab and Arisha, 2017; Tabachnick and Fidell, 2007). After the KMO and Bartlett's Sphericity test, the researchers performed EFA. The purpose of EFA was to refine and minimise the number of associated variables to a meaningful and manageable level before employing them in future analysis. Prior to determining convergent validity, a measurement model was evaluated to confirm its suitability for testing. The measurement model fit indices were determined using CMIN/DF (2/Df), Goodness of fit index (GFI), Adjusted GFI (AGFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative fit index (CFI), and Root mean square error of

approximation (RMSEA). The results indicate that the convergent validity requirements were met. The measurement model indicated appropriate model fit indices (CMIN//DF = 4.619; GFI = .899; AGFI = .871; NFI = .939; TLI = .944; CFI = .952 and RMSEA = .071). The standardised factor loadings (λ) and critical ratios (CRs) are shown in Table 2.

Tab. 2: *Construct, Item Description and Factor Loadings*

Item Code	Item Description	Factor Loadings (λ)	CR
Vehicle Maintenance	Spare parts fitted on vehicles are not properly tracked and managed in the organisation	.695	-
	Routine servicing of vehicles is as per the manufacturer's manual in the organisation.	.759	22.139***
	Vehicle fault parts are not replaced until the vehicle breaks down	.796	13.796***
	Vehicle fault parts are replaced before the failure occurs	.642	17.255***
	There is vehicle parts cannibalisation for better vehicle availability and performance.	.678	20.922***
Service Delivery	The organisation does not respond to customer queries in time	.711	-
	Fleet management personnel does not understand the core business of the organisation	.764	21.549***
	Vehicle fleet and other facilities are not well maintained	.602	26.186***
	Services are not provided within stipulated time frames	.814	23.666***
	There is the poor rapport between the organisation and its customer	.655	29.658***

Note: - CR is fixed; *** *p < 0.001*
Source: Survey Data (2021)

As shown on Table 2, results indicate that standardised factor loadings for all items were greater than the minimum requirement of 0.6 (Bagozzi and Yi, 1988). Similarly, critical ratios were significant at p < 0.001. Therefore, the minimum requirements for convergent validity were satisfied. Data Analysis and Presentation: Statistical Package for Social Scientists (SPSS)® version 20 for questionnaire items and Structural Equation Modelling (SEM) in AMOS® version 21 was used to assess the research hypothesis. While NVivo version 20 - Word Cloud was used to analyse and describe patterns or themes across a data set through word-cloud, tables and figures. Simply put, information was fed into the computer, results read, analysed and conclusions made.

Hypothesis Testing

The structural equation modelling (SEM) approach was used to test the relationship between vehicle maintenance and service delivery in AMOS version 21. The structural model was estimated using Maximum Likelihood Estimation (MLE) (Field, 2009). The SEM approach is appropriate since it can discover correlations as well as recommend a general match between observed data and the study model (McQuitty and Wolf, 2013). Model fit indices for the structural model were good (CMIN/DF = 1.89; GFI =.899; AGFI =.903; NFI =.910; TLI =.896; CFI =.919 and RMSEA =.147). The results of hypothesis testing are shown in Table 3.

Tab. 3: *Hypotheses testing (H_1)*

Hypothesis	Hypothesised Relationship	SRW	CR	Remark
H_1	Vehicle maintenance → service delivery	.227	13.025***	Supported

*Notes: SRW standardised regression weight, CR critical ratio, ** significant at p < 0.05, *** significant at p < 0.001,*
Source: Survey Data (2021)

The results provide adequate confirmation that vehicle fleet maintenance has a positive effect on service delivery. This finding implies that regular repair and maintenance of vehicle fleet by SOEs results in improve responsiveness, reliability, the condition of the vehicle, the needs of customers and contacts between frontline workers and customers. For example, when an SOE fails to routinely service its vehicles, vehicle downtime and breakdowns may increase thereby putting responsiveness and reliability of vehicles at risk. The results from this study conform with the majority of earlier studies such as those of Aflabo et al (2020); Ampiah, (2018); Mbaye (2019); Zacharof and Fontaras (2016); Gitahi and Ogollah (2014) which proved that vehicle fleet maintenance has a positive effect on service delivery. This, therefore, strengthens the position of this finding. The findings from this study also established that faulty vehicle parts in most SOEs are not replaced until the vehicle breaks down. This suggests that repair and maintenance of vehicles are not done regularly resulting in poor vehicle availability. This finding is confirmed by prior studies of Fontaras et al. (2017) who found that there is poor vehicle maintenance in most public entities which costs them a lot of money in terms of operation down-time and poor responsiveness to customers. This is echoed by Hu et al (2020) who observed that the condition of vehicles operating in most SOEs is generally poor, largely as a result of lack of preventive maintenance.

In addition, the study revealed that vehicle spare parts fitted on vehicles are not properly tracked and managed in most SOEs in Zimbabwe. This implies lack of vehicle spare parts visibility influences vehicle road worthiness, reliability and responsiveness. This result ties in well with findings by Aflabo et al., (2020) and Gitahi and Ogollah (2014) who observed that vehicle spare parts management has the potential to positively influence service delivery. In a like manner, Hu et al., (2018) explained that the availability of genuine spare parts reduces the consequences of vehicle downtime. This is supported by Manzini et al., (2010) who discovered that the inability to get spare parts as and when they are needed for repairs leads to significant financial loss and poor public service delivery. Similarly, Yiwarere and Lawal (2011) said that a vehicle maintenance plan cannot work unless it is supported by appropriate spare parts management. This is backed by Lin et al., (2019), who argued that spare parts management in the public sector is ineffective**.** In addition, the result ties in well with findings by Maulaya, Ridwan, and Santoso (2019) who found that many public sector organisations have not implemented advanced inventory management systems, which have disadvantaged them in terms of responsiveness to stock-outs, poor records, high stock costs, poor quality services, inventory obsolescence, and reduced efficiencies. Furthermore, the

study findings revealed that there is vehicle parts cannibalisation. This implies that certain vehicle parts are removed for repair from another vehicle rather than from inventory. This demonstrates that spare parts cannibalisation is used as an alternative to vehicle maintenance due to budgetary constraints. However, this significantly influences vehicle performance which ultimately affects vehicle condition in the long run, reliability and responsiveness.

5 CONCLUSIONS AND IMPLICATIONS

The study sought to establish the influence of vehicle fleet maintenance on service delivery. In that respect, the study findings established that there is sufficient evidence for the effect of vehicle maintenance on service delivery. It is evident from the results that vehicles are not regularly monitored, genuine spare parts fitted on vehicles are not properly tracked, there is vehicle parts cannibalisation and that vehicle faulty components are not replaced until failure occurs. To ensure that excellent services are delivered to citizens, SOEs should improve their approach to vehicle service, repair and maintenance. They should consider preventive maintenance as a way to reduce vehicle breakdowns and improve the lifecycle of vehicles as well as improve their scrap values. Preventative maintenance allows fleet custodians to continuously monitor the conditions of the vehicle and make routine servicing of vehicles as per the manufacturer's manual specifications. This increases vehicle availability, reliability and reduces customer complaints as a result of delays or failure to provide the service when required. In addition, SOEs should strive to deal with accredited vehicle dealers in order to reduce the possibility of using counterfeit spare parts. Counterfeit components may affect vehicle performance in terms of fuel consumption, vehicle maintenance costs and may cut short the expected lifecycle of the vehicle and expose the vehicle to accidents. Furthuremore, if it is possible to order a genuine toyota component from Toyota Japan to Africa, then computer experts should be able to track a componet from source to the beneficiary with a chip related to a chassis and or engine number.

Acknowledgement

The researchers feel indebted to the respondents for their cooperation and support on data collection of this study, thus, would want to thank one and all the respondents. In a like manner, recognition is extended to all the State-Owned Enterprises Directorates for facilitating provision of letters authorising the study within their organisations. Also, it would be no justice to me if I fail to acknowledge my assistants and peer reviewers for their frantic efforts to complete my project and of course, the Creator Jehovah God for the energy and free gift of life to this day when my project has been finalised.

REFERENCES

Aflabo J, Kraa, J. J. and Agbenyo, L. 2020. Examining the effect of fleet management on competitive advantage in the transport industry. *European Journal of Logistics, Purchasing and Supply Chain Management*, 8(2), pp. 7–23.

Ampiah, M. O. 2018. Challenges of Vehicle Fleet Management and Control in the University Education, Winneba,Ghana', *International Journal of Engineering and Advanced Technology Studies*, 6(1), pp. 15.

Auditor General Report. 2018. [Online available at: <https://www.auditorgeneral.gov.zw/phocadownload/Local-Authority/Local%20A%20uthorities%20Auditor%20Generals%20Report%202018.pd>. [Accessed 27 Jan. 2022].

Azwitamisi, L. and Ngwakwe, C. C. 2021. Public financial management efficiency and electricity service delivery in Limpopo municipalities. *International Journal of Public Sector Performance Management, 7*(3), pp. 301-313.

Bagozzi, R. and Yi, Y. 1988. On the Evaluation of Structural Equation Models. *Journal of the Academy of Marketing Sciences*, 16, pp. 74-94.

Bhattacharjee, K.S, Singh, H.K. and Ray, T. 2019. Many-Objective Optimization with Limited Computing Budget. High-Performance Simulation-Based Optimization, *Studies in Computational Intelligence* 833, 17-46, Springer International Publishing.

Bryman, Alan and Emma Bell. 2011. *Business Research Methods.* Cambridge ; New York, NY: Oxford University Press.

Creswell, J. 2014. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches: Fourth edition (4th ed.). SAGE Publications Inc, United Kingdom.

Dönmez, S. and Zemmouri, M. 2016. Analyzing the Value of Vehicle Maintenance Activities. Analyzing the Value of Vehicle Maintenance Activities, [online] Availanle at: <https://odr.chalmers.se/handle/20.500.12380/239190>. [Accessed 28 Sept. 2021].

Field, A. (2009) Discovering Statistics Using SPSS. 3rd Edition, Sage Publications Ltd., London

Fontaras, G., Zacharof, N. G. and Ciuffo, B. (2017). Fuel consumption and CO2 emissions from passenger cars in Europe – Laboratory versus real-world emissions. *Progress in Energy and Combustion Science*, 60, 97–131.

Frankema, Ewout and Booth, Anne (2019). Fiscal Capacity and the Colonial State: Lessons from a Comparative Perspective. In E. Frankema and A. Booth (Eds.), *Fiscal Capacity and the Colonial State in Asia and Africa, c.1850–1960* (Cambridge Studies in Economic History - Second Series, pp. 1-35). Cambridge: Cambridge University Press.

Giglio, J. M., Friar, J. H. and Crittenden, W. F. (2018). Integrating lifecycle asset management in the public sector. *Business Horizons*, 61(4), pp. 511–519.

Gitahi, P.M. and Ogollah, K. 2014. Influence of fleet management practices on service delivery to refugees in United National High Commissioner for Refugees, E*uropean Journal of Business Management*, 2(1), pp. 1-18.

Government of Zimbabwe, Ministry of State Enterprises and Parastatals (2012), Restructuring Procedures Manual, Zimbabwe.

Gudelis, D. and Guogis, A. 2011. Integrating public and business management: A model of interaction between public and private sectors. International Review on Public and Non – Profit Marketing, 8(1), pp. 1-9.

Hadebe S, Mandaza I, Moyo G, Mutondoro F. and Ncube M. J. 2015. Annual State of Corruption Report: Focus on State-Owned Enterprises: Transparency International Zimbabwe.

Herman, A. L. 2010. Equipment maintenance and repair management', SAE Technical Paper 850759.

Howell, M. and Alshakhshir, F.S. 2020. Different Maintenance Types and The Need for Energy Centered Maintenance. *Energy Centered Maintenance—A Green Maintenance System*, pp. 23-33, River Publishers, https://doi.org/10.1201/9781003151371-2

Hu, J, Shen, J. and Shen, L. 2020. Periodic preventive maintenance planning for systems working under a Markovian operating condition. *Computers and Industrial Engineering, 142*, 106291, ISSN 0360-8352, Elsevier BV, https://doi.org/10.1016/j.cie.2020.106291

Chiparo, J. P. Tukuta, M., and Musanzikwa, M. 2022. Vehicle Fleet Management Practices and Service Delivery in State Owned Enterprises in Zimbabwe. *Journal of Transportation Technologies*, 12(2), pp. 159-171

Lawal, T. and Oluwatoyin, A. 2011. National Development in Nigeria: Issues, Challenges and Prospects. *Journal of Public Administration and Policy Research*, 3, pp. 237-241.

Lin, J, Zheng, M, Chen, J, He, K. and Pan, E. 2019. Smart Spare Part Inventory Management System with Sensor Data Updating. *2019 IEEE International Conference on Industrial Cyber Physical Systems (ICPS)*, IEEE.

Lu, Y. (2017). Public capital asset management: a holistic perspective. journal of public procurement, 17(4), pp. 483–524.

Ma, S. C., Fan, Y. and Feng, L. 2017. An evaluation of government incentives for new energy vehicles in China focusing on vehicle purchasing restrictions', *Energy Policy*. 110, pp. 609–618.

Manyathi, S, Burger, A P.J. and Moritmer, N.L. 2021. Public sector procurement: A private sector procurement perspective for improved service delivery. *Africa's Public Service Delivery and Performance Review, 9*(1), pp. 1-11.

Manzini R., Regattrieri A., Pham H., Ferrari E. 2010. Maintenance for Industrial Systems, Springer, pp. 409–432.

Maulaya, A, Ridwan, A. and Santoso, B. 2019. Spare Part Inventory Policy Planning based on FRMIC (Fuzzy-Rule-based approach for Multi-Criteria Inventory Classification) using Base-Stock Policy Method (S-1, S). Advance in intelegent system research, 173, pp. 8.

McQuitty, S. and Wolf, M. 2013. Structural Equation Modeling: A Practical Introduction", *Journal of African Business*, 14(1), pp. 58–69.

Milakovich, M.E. 2021. Applying Digital Technologies to Improve Remote Delivery of Public Services. *Digital Governance*, Routledge,

Mudyazhezha, E,.E., and Mudyazhezha, C.O. 2020. The Challenges of Asset Management in Institutions of Higher Education in Masvingo Province, Zimbabwe. *International Journal of Research and Innovation in Social Science (IJRISS)*, 4, (8), pp. 763-776

Mutanda, D. 2014. The Impact of the Zimbabwean Crisis on Parastatals, International Journal of Politics and Good Governance. 5, (5.2), pp. 1-14.

Onyoni, L.N. 2018. Strategic Factors Affecting Service Delivery In County Governments Of Kenya: A Case Of Nairobi County Government. *Strategic Journal of Business and Change Management*, 5(1), pp. *398- 427.*

Osborne, Stephen P. 2020. *The Public Service Ecosystem*. Public Service Logic, 1st Edition, Routledge

Parasuraman, A., Zeithaml, V. A. and Berry, L. L. 1985. A conceptual model of service

quality and its implications for future research. *Journal of Marketing*, *49*(4), pp. 41–50.

Parliamentary Committee on Transport and Infrastructure Development. (2017). The Portfolio Committee on Transport And Infrastructural Familiarization Tour Of ' Victoria Falls And Harare Airports and the Plumtree-Bulawayo-Harare. Mutare Road Project

Priya, R, Vinothini, G. and Corpus D. 2019. A Study on Organisational Factors Influencing Knowledge Management Practices. *Journal of Advanced Research in Dynamical and Control Systems*, 11, pp. 1362-1368.

Ragab, M. and Arisha, A. 2017. Research Methodology in Business: A Starter's Guide. *Management and Organizational Studies*, 5(1), pp. 1-14.

Rahim, A.I, Fareq, T, Abulrahman, L.Q. and Bakr, H.H. 2021. Environment of Car Service Centers in Iraq. Its benefits? The most important problems field study on the reality of the services they provide. *Journal of Physics: Conference Series*, *1804*(1), pp. 1-7.

Rhode, A. 2019. Tenders in the EU. *Public Procurement in the European Union*, 17-44, Springer Fachmedien Wiesbaden,

Rossouw, J. and Weyer, L. 2019. The South African Government Vehicle Fleet must be Local. *Southern African Business Review*, *23*, pp. 1-27.

Rusvingo, S. L. 2014. The Salarygate Scandal in the Zimbabwe Parastatals Sector: Another Darkside of the Nation (2013-2014)", *Global Journal of Management and Business Research*: Administration and Management, 14(10), pp. 1-13.

Salonen, A. and Deleryd, M. 2011. Cost of poor maintenance: A concept for maintenance performance improvement. *Journal of Quality in Maintenance Engineering,* 17(1), pp. 63-73.

Shoko, E. and Naidu, M. 2020. Political conflict and community health in Zimbabwe: Health professionals' perspectives. *Africa's Public Service Delivery and Performance Review*, *8*(1), pp. 1-8.

Sun, He, Jiang, P, She, Q, Yu, C, Lin, H, Wu, X. and Lin, G 2019. Excessive-emission vehicles real-time track matching algorithm based on road network topology and weights. In *2019 Chinese Control Conference (CCC)*, IEEE, [Online] Available at: https://ieeexplore.ieee.org/abstract/document/8865886/citations?tabFilter=papers#citations. [Accessed on 28 Nov. 2021].

Tabachnick, B. G. and Fidell, L. S. 2007. Using Multivariate Statistics (5th ed.). New York: Allyn and Bacon.

Tu, J, Sun, Z. and Huang, M. 2021. Supply chain coordination considering e-tailer's promotion effort and logistics provider's service effort. *Journal of Industrial and Management Optimization*, 18 (3), pp. 2191-2220

Wal, R.V., Pampallis, A. and Bond, C. 2002. Service quality in a cellular telecommunications company: A South African experience. *Managing Service Quality*, 12(5) 2002, pp. 323-335.

Waldt, G. 2017. Governance Apparatus in South Africa: From Policy Design to Service Delivery. *Public Administration in Africa*, 1-25, Routledge.

Wollmann, H. 2020. *Local Public Enterprises as Providers of Public Services in European Countries*. The Routledge Handbook of State-Owned Enterprises, 45-59, Routledge,

Zacharof, N. G. and Fontaras, G. 2016. Review of in Use Factors Affecting the Fuel

Consumption and CO2 Emissions of Passenger Cars, [Online] available at: <https://data.europa.eu/doi/10.2790/140640> [Accesed 13 Dec. 2021]

Zhang, S., Huang, K. and Yufei, Y. 2021. Spare parts inventory management. A literature review, *Sustainability*, 13(5), pp. 1–23.

Zhang, Z, Tang, Q. and Chica, M. 2021. Maintenance costs and make span minimization for assembly permutation flow shop scheduling by considering preventive and corrective maintenance. *Journal of Manufacturing Systems*, 59, pp. 549-564.

Zvavahera, P. and Ndoda, G. R. 2014. Corporate Governance and ethical behaviour: The case of the Zimbabwe Broadcasting Corporation, *Journal of Academic and Business Ethics*, 9(1), pp. 1-8.