Multidisciplinary Reviews

REVIEW ARTICLE
Published Online: September 3, 2025
https://doi.org/10.31893/multirev.2026150

Evaluating tariff structures in public infrastructure: A literature review

Suharyoto[a] | **Dian Anita Nuswantara**[a] ✉ | **Abdul Mongid**[a] | **Pharatt Run**[b]

[a]State University of Surabaya, Surabaya, East Java, Indonesia.
[b]ISIC–Rajamangala University of Technology Krungthep, Bangkok, Thailand.

Abstract Determining tariffs for public services and utilities involves a complex interplay between financial sustainability, social equity, and economic efficiency. This study adopts a posthumanist lens and employs a Systematic Literature Review (SLR) using the PRISMA framework to examine how tariff-setting mechanisms are formulated, particularly in the context of developing economies. A total of 14 high-quality open-access articles were selected through a rigorous process of identification, screening, eligibility, and quality appraisal using the Mixed-Methods Appraisal Tool (MMAT). Findings reveal that traditional cost-based pricing methods—such as the rate of return (RoR) and long-run average cost (LRAC) models—remain foundational, but are increasingly complemented by multidimensional frameworks that consider regulatory structures, social justice, environmental concerns, and technological innovations. Pricing models like Increasing Block Tariffs (IBTs) and time-of-use tariffs are widely applied to promote efficiency and conservation while maintaining affordability. However, their success heavily depends on governance quality, demand forecasting, and regulatory oversight. Technological advancements, including smart metering and real-time analytics, are reshaping tariff structures by enabling dynamic, data-driven pricing systems. Environmental considerations, such as the integration of renewable energy sources, are also becoming integral in designing adaptive and forward-looking tariff mechanisms. Moreover, political economy factors—such as tariff mimicking and cross-subsidization—affect both pricing fairness and financial sustainability. Best practices from countries like Thailand, Brazil, and Estonia underscore the need for a transparent and responsive regulatory environment to ensure effective tariff-setting. This study concludes that future tariff models must adopt a multicriteria approach integrating economic, social, regulatory, and technological factors. Policymakers should prioritize inclusive, adaptable, and transparent pricing strategies that align with sustainability goals, enhance service quality, and support equitable access, consistent with the broader posthumanist perspective on public governance.

Keywords: pricing mechanisms, regulatory oversight, cost recovery, public–private partnerships, dynamic pricing

1. Introduction

The importance of pricing in public services and utilities versus efficiency has been an important debate in the public sector (Andrews & Entwistle, 2014; Slack, 2016). The traditional humanist view holds that public service and utility tariffs serve as essential mechanisms for balancing financial sustainability and consumer affordability. These tariffs ensure cost recovery for service providers while promoting equitable access to essential utilities such as electricity, water, and telecommunications. Posthumanists agree that determining appropriate pricing structures is a complex challenge influenced by various economic, regulatory, social, and technological factors (Felgendreher & Lehmann, 2016; McIlwaine & Ouda, 2020). Therefore, in determining tariffs, posthumanists encourage ideas to update how the development of tariff-setting methods needs to place human interests as part of a wider network involving technology, the environment, and other nonhuman entities (Fox & Alldred, 2020).

Traditional tariff-setting approaches rely on cost-based methodologies to ensure financial sustainability, but these methods often fail to take into account the broader social and economic implications and the value of technologies that are critical to a civilization. Recent studies highlight the increasing adoption of multimodel approaches that integrate regulatory, environmental, and equity considerations to optimize pricing structures (Doshmangir et al., 2020). Additionally, pricing models such as increasing block tariffs (IBTs) have gained popularity for their ability to incentivize conservation while maintaining affordability for lower-income consumers (Fuente et al., 2021; Klassert et al., 2018). However, their effectiveness depends on implementation, market conditions, and governance structures.

Given these complexities, policymakers and regulators must consider multiple factors when designing tariff policies. The political economy of tariff setting also plays a crucial role, with practices such as tariff mimicking—where municipalities adjust their rates on the basis of neighboring jurisdictions rather than cost structures—affecting pricing efficiency and service quality (Swianiewicz & Lukomska, 2018). Moreover, technological advancements and environmental policies increasingly influence

 Received: May 4, 2025 | Accepted: June 21, 2025

tariff structures, requiring adaptive regulatory frameworks to balance cost recovery with sustainability goals (Salzman & Molina, 2009).

This study uses a systematic literature review (SLR) to examine how public service and utility tariffs are set and what factors influence their pricing structures. By synthesizing findings from different sectors and geographic contexts, this study aims to provide insights into best practices and policy recommendations for optimizing tariff-setting mechanisms that challenge traditional humanist views.

Tariff determination for public services and utilities has been extensively studied from economic and regulatory perspectives. Traditional cost-based pricing models, such as the rate of return (RoR) approach and the long-term average cost (LRAC) model, remain widely used to ensure financial sustainability. However, as posthumanists argue, these models often fail to address broader socioeconomic factors and integrate the value of technology, leading to inefficiencies in pricing structures. Studies adopting posthumanist thinking advocate multidimensional pricing models that incorporate economic, social, regulatory, and technological factors to balance cost recovery and affordability.

Economic considerations are fundamental in determining tariff levels, as they encompass key components such as infrastructure funding, operational costs, and variations in consumer demand. In many cases, utilities implement increasing block tariffs (IBTs), where higher consumption leads to progressively higher rates. This model is widely used in water and electricity pricing to encourage conservation while ensuring affordability for lower-income consumers (Li et al., 2024). However, the success of IBTs depends on accurate demand forecasting and regulatory oversight to prevent unintended financial burdens on households (Fuente et al., 2021).

Regulatory and governance frameworks also influence tariff structures. Many governments adopt cross-subsidization policies to support vulnerable populations while ensuring that service providers maintain financial stability. However, political pressures can distort pricing efficiency, as seen in the phenomenon of tariff mimicking, where municipalities set rates on the basis of neighboring jurisdictions rather than actual cost structures (Swianiewicz & Lukomska, 2018). Effective tariff setting requires independent regulatory oversight to ensure that pricing remains fair, transparent, and aligned with economic conditions (Doshmangir et al., 2020).

Technological advancements further shape tariff structures, particularly in the energy and telecommunications sectors. The rise of dynamic pricing mechanisms, such as time-of-use tariffs, allows for flexible pricing adjustments on the basis of peak and off-peak demand, promoting efficient resource use (Lapteva et al., 2024). Similarly, public–private partnerships (PPPs) have emerged as a viable strategy for financing infrastructure projects, attracting private investment while maintaining affordability for end-users (Tobing & Israhadi, 2021).

2. Materials and Methods

2.1. Review protocol - PRISMA

The PRISMA framework is fundamental in conducting systematic literature reviews with a structured, transparent, and reproducible approach (Gabriele & Martins, 2023; Noeikham et al., 2024). By following PRISMA guidelines (Mishra & Mishra, 2023), this study ensures that the literature selection and synthesis processes are systematic and objective (Gao et al., 2021). The continuous updates of the PRISMA guidelines help refine research methods and improve the quality of systematic reviews across various disciplines (Page et al., 2021).

2.2. Formulation of research questions

The research question for this study is formulated as follows: “How are public service or utility tariffs determined, and what factors influence their pricing structures?”. This research question aims to explore the methodologies, regulatory frameworks, financial mechanisms, and socioeconomic considerations involved in setting tariffs for public services and utilities. This study aims to uncover recurring themes, emerging developments, and overlooked areas within existing research on pricing strategies and tariff design.

2.3. Systematic strategy

2.3.1. Identification

The literature search was conducted via the Scopus Database (URL: https://scopus.com/), which hosts a vast collection of peer-reviewed journals and conference proceedings (Hawkes, 2018). Scopus is a widely recognized academic database offering extensive indexing and citation tracking (Zahedi et al., 2014), making it a reliable source for conducting a systematic literature review. To identify relevant studies, the following search query and Boolean operators were used: "public service" OR "public utility" OR "tariff". This search was applied to article titles, abstracts, and keywords to ensure the comprehensive retrieval of relevant studies.

2.3.2. Screening

The screening process aims to refine the initial search results to ensure that the selected studies align with the research objectives. Initially, 179 articles were retrieved from the Scopus database via the defined search keywords and Boolean operators. To increase the relevance of the selected studies, the following inclusion criteria were applied: only English-language journal articles, open-access publications, and research conducted within the 1974–2025 time frame were considered. After applying these filters, the dataset was reduced to 115 articles. A keyword-based relevance check further narrowed the selection to 44 articles, ensuring that only studies explicitly related to public service, public utility, or tariffs were retained. Finally, to facilitate accessibility and deeper analysis, only 15 open-access articles were selected for full-text review.

2.3.3. Eligibility

In the eligibility stage, the full-text versions of the selected studies were carefully reviewed to verify their alignment with the research objectives. Articles that failed to satisfy the established inclusion parameters were systematically omitted, with clear justification recorded to ensure objectivity and reduce the risk of selection bias. The exclusion criteria were as follows: studies that focused primarily on private-sector pricing models, studies unrelated to public service or utility tariff structures, and studies centered on developed countries, as the focus of this study is on developing economies. After these criteria were applied, 14 articles were deemed eligible and were included in the synthesis phase (Figure 1).

2.3.4. Quality appraisal

To ensure the methodological rigor and reliability of the findings, a quality appraisal was conducted via the Mixed-Methods Appraisal Tool (MMAT). Each study was assessed on the basis of key evaluation criteria, including the appropriateness of the research design, the robustness of the data collection methods, and the validity of the analytical approaches used in examining public service and utility tariffs. This systematic assessment ensured that only high-quality, methodologically sound studies were included, reinforcing the credibility of the literature synthesis.

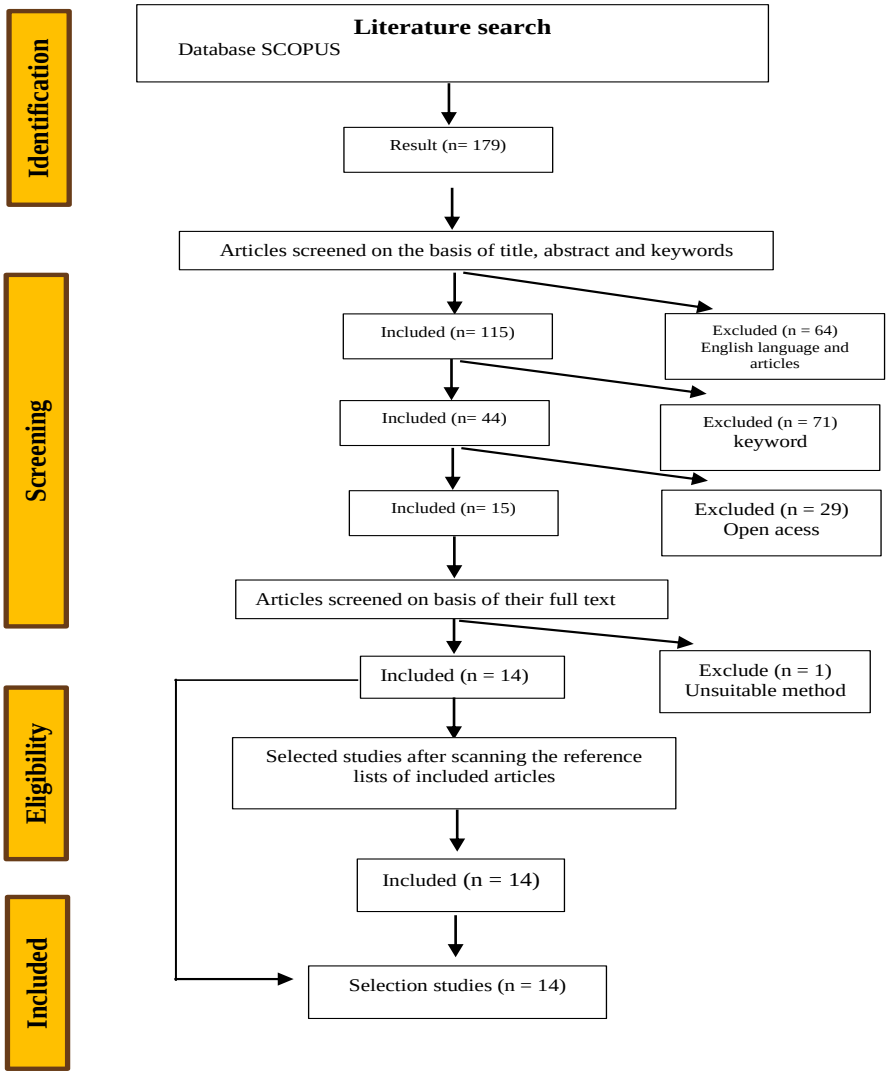

Figure 1 PRISMA framework.

3. Discussion

In alignment with the posthumanist view, the determination of public service and utility tariffs is a complex process influenced by various economic, social, regulatory, and technological factors. Different methodologies are applied to ensure that tariffs are fair, cost reflective, and aligned with long-term sustainability goals. The findings from this review highlight several key approaches in tariff determination and the factors that shape their pricing structures.

3.1. Tariff determination methods

One of the most widely used approaches in tariff setting is the cost-based method, where pricing is determined by considering the actual costs incurred by service providers. This includes operational expenses, infrastructure maintenance, and financial requirements to sustain service delivery (Granaturov et al., 2015). The rate of return approach ensures that utilities generate sufficient revenue to maintain operations while providing reasonable profits for investors (Mozhevikina, 2014). Moreover, the long-run average cost method considers future cost fluctuations, aiming to distribute expenses over an extended period to achieve pricing stability. These methodologies are particularly relevant for sectors such as electricity and water supplies, where significant capital investments are required (Salzman & Molina, 2009).

In addition to cost-based models, integrated approaches have emerged as effective strategies for tariff determination. The multimodel approach incorporates economic, social, and regulatory considerations, balancing the interests of service providers, regulators, and consumers (Pinto & Marques, 2016). Another important framework is the investment rate calculation, which determines tariff structures on the basis of anticipated capital expenditures and expected returns, ensuring continuous investment in infrastructure development (Glyzina et al., 2016).

Another widely adopted pricing model is the block tariff system, which introduces tiered pricing to encourage efficient resource use. This method is commonly applied in the electricity and water sectors, where consumption-based pricing promotes conservation. Under this system, users incur varying charges based on the volume of their consumption, which helps keep basic usage affordable while deterring overconsumption (Liao & Tsai, 2016).

3.2. Influencing factors in tariff determination

Several factors contribute to the establishment of public service and utility tariffs. Economic factors play a fundamental role, as pricing must account for operational and capital costs. Infrastructure investments, maintenance expenses, and depreciation of assets are crucial elements embedded in tariff structures (Balatskyi & Lavryk, 2019). Additionally, supply and demand dynamics influence pricing, particularly in sectors where fluctuations in consumption necessitate periodic tariff adjustments (Teetong, 2014).

In addition to economic considerations, social and regulatory factors significantly impact tariff determination. Public service obligations, such as subsidies for vulnerable populations, may lead to tariff modifications to ensure affordability and accessibility (Verhaegen et al., 2005). Regulatory frameworks, enforced by government agencies, establish guidelines for tariff adjustments, as seen in the case of Thailand's Energy Regulatory Commission, which standardizes electricity tariffs on the basis of economic indicators and service costs (Teetong, 2014). Ensuring equity and fairness in pricing is also a critical aspect, particularly for low-income consumers, who may require special tariff structures to prevent excessive financial burdens (Postnikov, 2022).

Technological advancements and environmental sustainability concerns further shape tariff policies. Efforts to improve energy efficiency and the shift toward renewable energy significantly impact pricing frameworks, as funding cleaner technologies requires modifications to existing tariff systems (Kim et al., 2023). Furthermore, quality of service indicators, such as reliability metrics (e.g., SAIDI, SAIFI, and CAIDI), are often integrated into tariff-setting mechanisms to ensure that service providers maintain high-performance standards (Ots et al., 2016).

3.3. Case studies and practical applications

The application of these tariff methodologies varies across different public service sectors and geographical regions. For example, telecommunication services rely on cost simulation modelling to establish tariffs that reflect operational expenses while ensuring affordability for consumers (Granaturov et al., 2015). In Thailand, a uniform tariff structure is implemented in the electricity sector to balance cost recovery and consumer protection (Teetong, 2014). Similarly, Brazil's urban water pricing system employs an increasing block tariff model, which has been subject to regulatory revisions to improve efficiency and equity in water distribution (Mesquita & Ruiz, 2013).

Additionally, tariff regulation approaches for public transport services emphasize a balance between service affordability and financial viability (Postnikov, 2022). The Estonian model of incentive-based pricing regulation also provides a reference for improving tariff-setting policies, ensuring both cost recovery and performance efficiency (Ots et al., 2016). Furthermore, in Argentina, regulatory mechanisms for electricity pricing are designed to optimize social welfare by adjusting tariffs on the basis of economic and service-related variables (Salzman & Molina, 2009).

4. Final Considerations

The research findings support the view that the determination of public service and utility tariffs is a complex and multifaceted process influenced by economic, social, regulatory, and technological factors. Various methodologies, such as cost-based approaches, block tariff systems, and multimodal frameworks, are implemented to balance financial sustainability with affordability and equity. While traditional methods such as the rate of return and long-term average cost models ensure cost recovery and investor returns, more dynamic models, such as increasing block tariffs (IBTs) and time-of-use pricing, are increasingly adopted to promote efficiency, conservation, and fair access to services.

Economic factors, including operational costs, capital investments, and demand elasticity, remain central to tariff setting. However, tariff structures must also account for public service obligations, government regulations, and consumer welfare. In many cases, subsidies and cross-financing mechanisms are employed to protect vulnerable populations, yet political and governance challenges, such as tariff mimicking, often lead to inefficiencies and financial strain on utility providers. Effective tariff determination requires transparent regulatory oversight to ensure that pricing strategies align with service costs while maintaining public trust and accountability.

The role of technology in shaping tariff structures is also expanding. Smart metering, real-time pricing mechanisms, and digital platforms allow more flexible and responsive tariff adjustments on the basis of real-time consumption data. These innovations contribute to more efficient resource management while enabling consumers to make better-informed choices about their utility consumption. Similarly, environmental considerations, such as the integration of renewable energy sources and sustainability policies, are reshaping traditional pricing frameworks, requiring regulators to adapt to the evolving energy landscape.

Moving forward, a multicriteria approach that integrates economic, social, regulatory, and technological dimensions is essential for optimizing public utility tariff structures. Policymakers must consider data-driven pricing mechanisms, consumer affordability, and infrastructure investments while ensuring that tariffs remain transparent, justifiable, and adaptable to changing market conditions. In addition to the posthumanist view, future research should focus on refining pricing models that enhance economic efficiency, social equity, and environmental sustainability as well as technological advancement, ensuring that public services remain both accessible and financially viable in the long term.

Ethical Considerations

Not applicable.

Conflict of Interest

The authors declare that they have no conflicts of interest.

Funding

This research did not receive any financial support.

References

Andrews, R., & Entwistle, T. (2014). *Public service efficiency: Reframing the debate*. Routledge.

Balatskyi, I., & Lavryk, V. (2019). Defining the tariff burden when providing the housing and utilities services in Ukraine. *Public and Municipal Finance, 8*(1), 112–119. https://doi.org/10.21511/pmf.08(1).2019.10

Doshmangir, L., Rashidian, A., Kouhi, F., & Gordeev, V. S. (2020). Setting health care services tariffs in Iran: half a century quest for a window of opportunity. *International Journal for Equity in Health, 19*(1). https://doi.org/10.1186/s12939-020-01224-1

Felgendreher, S., & Lehmann, P. (2016). Public Choice and Urban Water Tariffs—Analytical Framework and Evidence From Peru. *Journal of Environment and Development, 25*(1), 73–99. https://doi.org/10.1177/1070496515619651

Fox, N. J., & Alldred, P. (2020). Sustainability, feminist posthumanism and the unusual capacities of (post)humans. *Environmental Sociology, 6*(2), 121–131. https://doi.org/10.1080/23251042.2019.1704480

Fuente, D., Kabubo-Mariara, J., Kimuyu, P., Mwaura, M., & Whittington, D. (2021). Assessing the Performance of Water and Sanitation Tariffs: The Case of Nairobi, Kenya. *Water Resources Research, 57*(9). https://doi.org/10.1029/2019WR025791

Gabriele, F., & Martins, L. (2022). Human–car interface: A systematic literature review. In P. Arezes, J. Santos, M. J. Pinto, C. Costa, R. Melo, A. S. Oliveira, G. Dinis-Carvalho, & N. Duarte (Eds.), *Occupational and environmental safety and health IV* (pp. 631–645). Springer. https://doi.org/10.1007/978-3-031-06461-3_70

Gao, Z., Xu, Y., Sun, C., Wang, X., Guo, Y., Qiu, S., & Ma, K. (2021). A systematic review of asymptomatic infections with COVID-19. *Journal of Microbiology, Immunology and Infection, 54*(1), 12–16. https://doi.org/10.1016/j.jmii.2020.05.001

Glyzina, T. S., Kolbysheva, Yu. V., Grivtsova, I. S., & Dmitrieva, N. V. (2016). Tariffs Formation on oil transportation. *IOP Conference Series: Earth and Environmental Science, 43*(1). https://doi.org/10.1088/1755-1315/43/1/012088

Granaturov, V., Kaptur, V., & Politova, I. (2015). Determination of tariffs for telecommunication services on the basis of cost simulation modelling. *Economic Annals-XXI, 1–2*(1), 52–56. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84939248724&partnerID=40&md5=0dd1c54362e99f1f0ace5d892f6f68cd

Hawkes, A. G. (2018). Hawkes processes and their applications to finance: A review. *Quantitative Finance, 18*(2), 193–198. https://doi.org/10.1080/14697688.2017.1403131

Kim, K., Choi, J., Lee, J., Lee, J., & Kim, J. (2023). Public preferences and increasing acceptance of time-varying electricity pricing for demand side management in South Korea. *Energy Economics, 119.* https://doi.org/10.1016/j.eneco.2023.106558

Klassert, C., Sigel, K., Klauer, B., & Gawel, E. (2018). Increasing block tariffs in an arid developing country: A discrete/continuous choice model of residential water demand in Jordan. *Water (Switzerland), 10*(3). https://doi.org/10.3390/w10030248

Lapteva, S., Mottaeva, A., Kopytina, Y., & Kochetkov, I. (2024). Regulation of electricity consumption based on tariffs setting. In *E3S Web of Conferences* (Vol. 592, p. 03023). EDP Sciences. https://doi.org/10.1051/e3sconf/202459203023

Li, J., Liu, W., Du, L., & Xiao, J. (2024). High-tech industry agglomeration and regional green development: An analysis of spatial Durbin model. *Technological Forecasting and Social Change, 205.* https://doi.org/10.1016/j.techfore.2024.123372

Liao, C.-N., & Tsai, H.-W. (2016). Modeling of a Block Tariff System for Groundwater Regulation. *Natural Resource Modeling, 29*(4), 520–537. https://doi.org/10.1111/nrm.12108

McIlwaine, S. J., & Ouda, O. K. M. (2020). Drivers and challenges to water tariff reform in Saudi Arabia. *International Journal of Water Resources Development, 36*(6), 1014–1030. https://doi.org/10.1080/07900627.2020.1720621

Mesquita, A. M., & Ruiz, R. M. (2013). A financial economic model for urban water pricing in Brazil. *Urban Water Journal, 10*(2), 85–96. https://doi.org/10.1080/1573062X.2012.699073

Mishra, V., & Mishra, M. P. (2023). PRISMA for review of management literature – Method, merits, and limitations – An academic review. In *Advancing methodologies of conducting literature review in management domain* (pp. 125–136). Emerald Publishing. https://doi.org/10.1108/9781802624439-010

Mozhevikina, M. (2014). State regulation of housing and public utilities services as a factor of social and economic development. *Actual Problems of Economics, 155*(5), 119–125. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84906096573&partnerID=40&md5=e3c871e8a4fb240249a14e761afb0784

Noeikham, P., Buakum, D., & Sirivongpaisal, N. (2024). Architecture designing of digital twin in a healthcare unit. *Health Informatics Journal, 30*(4), 14604582241296792. https://doi.org/10.1177/14604582241296792

Ots, M., Kisel, E., Hamburg, A., & Mere, T. (2016). Estonian experience in implementation of incentive type of price regulation. *2016 57th International Scientific Conference on Power and Electrical Engineering of Riga Technical University, RTUCON 2016.* https://doi.org/10.1109/RTUCON.2016.7763082

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, 372*, n71. https://doi.org/10.1136/bmj.n71

Pinto, F. S., & Marques, R. C. (2016). Tariff Suitability Framework for Water Supply Services: Establishing a Regulatory Tool Linking Multiple Stakeholders' Objectives. *Water Resources Management, 30*(6), 2037–2053. https://doi.org/10.1007/s11269-016-1268-z

Postnikov, V. (2022). Perfection of tariff regulation approaches for public transport services. *Transportation Research Procedia, 63*, 316–321. https://doi.org/10.1016/j.trpro.2022.06.018

Salzman, C. H., & Molina, J. C. (2009). A method to carry out the regulation of electricity tariffs for the maximization of the social welfare - The argentine case. *IET Conference Publications, 550 CP.* https://doi.org/10.1049/cp.2009.0619

Slack, E. (2016). Sustainable development and municipalities: Getting the prices right. In *Canadian Public Policy, 42*(1), S73–S78. University of Toronto Press Inc. https://doi.org/10.3138/cpp.2015-024

Swianiewicz, P., & Lukomska, J. (2018). Is There Tariff Mimicking? The Case of Water Provision in Poland. *4th International Scientific Conference Geobalcanica 2018.*

Teetong, R. (2014). The efficiency of pricing mechanism on tariff structure in Thailand. *CIGRE Session 45 - 45th International Conference on Large High Voltage Electric Systems 2014, 2014-August.* https://www.scopus.com/inward/record.uri?eid=2-s2.0-85047113888&partnerID=40&md5=865e99196c74bc39f984701d62b98616

Tobing, Y. L., & Israhadi, E. I. (2021). Tariff Setting as Investment Guarantee on Public to Private Cooperation in Infrastructure Development. In *ICLSSEE 2021: Proceedings of the 1st International Conference on Law, Social Science, Economics, and Education.*

Verhaegen, K., Meeus, L., & Belmans, R. (2005). The influence of public service obligations on distribution network tariffs. *Series on Energy and Power Systems*, 263–268. https://www.scopus.com/inward/record.uri?eid=2-s2.0-30644476624&partnerID=40&md5=7dd96366b62dfb5b59d61ac32f952211

Zahedi, S. M., & Lee, B. C. (2014). REF: Resource elasticity fairness with sharing incentives for multiprocessors. *ACM SIGPLAN Notices, 49*(4), 145–160. https://doi.org/10.1145/2644865.2541966