



Enhancing Global Connectivity and Innovation through Adaptive Taxation in the Digital Economy and Technopreneurship

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Abstract

The rapid growth of the digital economy presents unprecedented opportunities for innovation and economic inclusion. However, significant gaps in digital infrastructure and outdated tax policies continue to hinder equitable participation and value creation across regions. This paper explores how adaptive taxation—spanning digital services taxes (DST), R&D incentives, and global anti-base erosion frameworks—can serve as a catalyst to accelerate connectivity and technopreneurial ecosystems. Drawing on systematic literature review and comparative case studies from Indonesia, the Philippines, and Singapore, the study proposes an Integrated Taxation Framework for the Digital Economy (ITF-DE), linking fiscal policy to infrastructure investment, innovation incentives, and regulatory reform. Findings indicate that harmonized tax policies, targeted fiscal incentives, and digitalized tax administration play a vital role in fostering inclusive innovation and digital entrepreneurship on a global scale.

Keywords: digital taxation; technopreneurship; global connectivity; R&D incentives; digital economy; fiscal policy

1. Introduction

By 2024, an estimated 2.6 billion individuals—equivalent to nearly 32% of the global population—remain disconnected from the internet, with stark disparities in broadband access between high-income and low-income countries. In low-income economies, internet penetration stands at less than 30%, compared to over 90% in developed nations (International Telecommunication Union [ITU], 2024). This persistent digital divide limits not only access to information but also participation in digital markets, education, and innovation. While mobile technologies and cloud infrastructure have dramatically transformed the digital landscape, their benefits remain unevenly distributed, often bypassing rural communities and underfunded regions. These gaps not only hinder human development but also restrict the fiscal capacity of governments to collect revenue from digital transactions that increasingly dominate global commerce (World Bank, 2024). Bridging this divide requires both investment in physical infrastructure and a policy framework that supports universal, affordable access to digital services.

In parallel, the rapid expansion of the digital economy has exposed critical shortcomings in existing tax systems, many of which were designed for traditional, brick-and-mortar economic models. Digital business models—characterized by intangible assets, remote service delivery, and cross-border data flows—often escape effective taxation due to outdated nexus rules and fragmented international coordination (OECD, 2021). As a result, many jurisdictions struggle with base erosion and profit shifting, whereby multinational digital platforms shift income to low-tax jurisdictions while generating significant revenues in untaxed or undertaxed markets. This misalignment contributes to fiscal leakage, eroding the tax base of developing countries in particular. Moreover, the absence of coherent digital taxation frameworks reduces incentives for governments and investors to expand broadband infrastructure or support technopreneurial ecosystems (United Nations Conference on Trade and Development [UNCTAD], 2023). Tax reform in the digital era, therefore, must prioritize both equity and economic stimulus by modernizing rules to align with digital value creation.

In light of mounting challenges posed by digitalization, governments across the globe are recalibrating their tax systems to better align with the realities of a borderless, data-driven economy.

Traditional tax instruments are increasingly inadequate to address the rise of digital platforms, e-commerce, and intangible asset flows. To restore fairness and protect domestic tax bases, some countries have unilaterally introduced turnover-based taxes on digital transactions. For example, Indonesia has implemented a 0.5% final income tax on gross revenue generated by digital merchants operating on online platforms (Ministry of Finance Republic of Indonesia, 2023). This policy aims to equalize tax treatment between online and offline sellers, particularly in the micro, small, and medium enterprise (MSME) segment, which plays a critical role in the national economy. However, such unilateral measures—while expedient—raise concerns about double taxation and international fragmentation if not harmonized through multilateral frameworks (OECD, 2022).

To address these concerns and reduce harmful tax competition, the OECD/G20 Inclusive Framework on Base Erosion and Profit Shifting (BEPS) has developed a coordinated global solution. Under Pillar Two of the BEPS 2.0 initiative, the framework introduces the Global Anti-Base Erosion (GloBE) rules, which establish a global minimum effective corporate tax rate of 15% for large multinational enterprises (OECD, 2021). This reform is designed to ensure that profits are taxed at a minimum level regardless of where a company is headquartered or where its digital services are consumed. By setting a floor for tax competition, the GloBE rules aim to curb aggressive profit shifting and restore the integrity of the international tax system. Although implementation remains complex—particularly for developing countries with limited administrative capacity—the global minimum tax represents a significant step toward rebalancing the distribution of taxing rights in the digital economy (UNCTAD, 2023). Successful adoption will depend on continued cooperation, capacity-building, and legal integration into domestic tax codes.

This paper explores the evolving role of taxation as not merely a tool for revenue generation, but as a strategic lever to promote digital transformation and inclusive economic growth. In the context of the digital economy, taxation can serve as a catalyst for expanding broadband infrastructure, incentivizing innovation, and fostering technopreneurship—particularly in emerging markets where digital gaps remain wide. Traditional tax frameworks often fail to capture the complexity of digital value creation and, in many cases, discourage investment in technology-driven sectors. By contrast, adaptive fiscal policies—such as R&D tax credits, digital services taxes, and incentives for infrastructure development—can help governments unlock the full potential of the digital economy. This study argues that a well-designed tax system can support broader development objectives by aligning fiscal instruments with digital inclusion goals. Through a combination of literature review and case analysis, the paper provides insights into how tax policy can drive innovation, competitiveness, and equitable digital access.

2. Methods

This study adopts a qualitative research design grounded in a systematic literature review (SLR) to analyse the evolving nexus between taxation, digital connectivity, and technopreneurship. The review process involved identifying, screening, and synthesizing 48 scholarly articles, policy reports, and technical documents published between 2019 and 2025. Sources were drawn from reputable databases such as OECD iLibrary, World Bank Open Knowledge Repository, Scopus, and Google Scholar. Inclusion criteria focused on literature addressing digital taxation, R&D incentives, broadband infrastructure policy, and innovation ecosystems, with emphasis on relevance to emerging economies. The SLR method facilitates a comprehensive understanding of theoretical models and empirical evidence, helping to identify patterns, contradictions, and gaps in current fiscal approaches to the digital economy (Snyder, 2019). This rigorous review framework ensures analytical depth and enhances the validity of the findings by anchoring them in diverse yet credible academic and policy perspectives.

In addition to the literature review, the research incorporates a comparative case study approach to examine national-level fiscal reforms in Indonesia, the Philippines, and Singapore—three Southeast Asian economies at different stages of digital transformation. These cases were selected based on their distinct policy responses to digital taxation and innovation incentives, enabling comparative insights into how fiscal tools impact connectivity and technopreneurship. Key indicators analysed include broadband penetration rates, adoption of digital services taxes, R&D tax incentive utilization, and innovation outputs such as intellectual property registrations and venture capital flows (World Bank, 2024; OECD, 2023). Secondary data were obtained from official government publications, tax authority reports, and international development institutions. This mixed-methods approach enables triangulation between policy analysis and empirical outcomes, strengthening the study's capacity to formulate evidence-based recommendations. By combining macro-level insights

with context-specific observations, the research aims to offer actionable guidance for tax policy reform in the digital era.

3. Results and Discussion

a. Connectivity Gaps and the Role of Fiscal Policy

Significant disparities in digital infrastructure continue to pose a major challenge to equitable development, particularly in rural and underserved areas of emerging economies. While urban centers benefit from advanced digital networks and reliable broadband access, many rural communities remain isolated from the digital world due to inadequate infrastructure and high deployment costs. In countries such as Indonesia, for instance, over 43% of rural households still lack access to basic broadband services, limiting their ability to participate in digital commerce, access e-government services, or benefit from online education and telemedicine (World Bank, 2024). These gaps reinforce socio-economic inequalities and hinder the development of inclusive digital ecosystems. Addressing this divide requires not only infrastructure investment but also enabling policy frameworks—particularly in the fiscal domain—that support the expansion of affordable, high-quality connectivity in less commercially viable regions (International Telecommunication Union [ITU], 2024).

Fiscal incentives can play a critical role in accelerating the deployment of digital infrastructure by reducing the cost of capital and attracting private investment to underserved markets. Instruments such as import duty reductions on telecommunications equipment, VAT exemptions on broadband network expansion, and tax credits for infrastructure development are increasingly being adopted as part of national digital strategies (OECD, 2022). These incentives make infrastructure projects more financially feasible, especially in regions with low return on investment. In addition, accelerated depreciation schemes and investment allowances have proven effective in mobilizing private sector participation in long-term connectivity projects. By strategically applying these tools, governments can align private profit motives with national digital inclusion goals, enabling faster and more equitable rollout of internet infrastructure.

A notable example of fiscal policy integration into digital development is the Philippines' 2024 Digital Transformation Development Policy Loan (DPL), supported by the World Bank. This policy package includes targeted tax measures such as VAT exemptions for telecommunications infrastructure, simplified procedures for digital service providers, and incentives for innovation in digital public services (World Bank, 2024). The DPL aims to address barriers to connectivity while promoting digital entrepreneurship and government service digitalization. Crucially, the program recognizes the catalytic role of tax relief in expanding infrastructure to underserved populations, especially in remote and low-income areas. The Philippine model demonstrates how comprehensive fiscal reforms—aligned with digital policy priorities—can foster an inclusive digital economy, reduce deployment costs, and stimulate private sector involvement in national broadband initiatives.

These experiences underscore the importance of designing fiscal frameworks that are not only efficient and transparent but also geographically targeted and development oriented. Governments should consider adopting performance-based tax incentives that reward investment in connectivity infrastructure in rural or low-income areas, while also ensuring accountability and measurable outcomes. Moreover, regional cooperation and harmonization of digital taxation policies are increasingly essential to prevent regulatory fragmentation and encourage cross-border investment in infrastructure (UNCTAD, 2023). As countries accelerate their digital transformation agendas, tax policy must evolve beyond its traditional role to become a proactive instrument for promoting innovation, inclusion, and long-term national competitiveness in the digital age.

b. Global Tax Design and Digital Equity

The Global Anti-Base Erosion (GloBE) framework, developed under Pillar Two of the OECD/G20 Inclusive Framework, aims to curb harmful tax competition by establishing a minimum effective global tax rate of 15% for large multinational enterprises (MNEs). This initiative responds to widespread concerns over base erosion and profit shifting (BEPS), where MNEs shift profits to low-tax jurisdictions despite generating substantial revenue in other markets (OECD, 2021). By introducing a coordinated minimum tax floor, the GloBE rules seek to limit the "race to the bottom" in corporate tax rates and ensure that MNEs contribute a fair share of taxes, regardless of their place of incorporation or operation. The reform is especially significant in the digital economy, where value creation increasingly relies on intangible assets and cross-border data flows, which traditional tax

systems struggle to capture. As such, GloBE marks a major milestone in the global effort to modernize corporate tax rules in the digital age.

However, implementing GloBE poses significant challenges for low- and middle-income countries (LMICs), many of which lack the institutional capacity, technical expertise, and digital infrastructure needed to enforce complex international tax standards. While high-income countries may already have sophisticated tax authorities capable of administering global minimum tax calculations and ensuring compliance across borders, LMICs often struggle with basic tax administration, including enforcement, taxpayer registration, and digital recordkeeping (UNCTAD, 2023). The intricacies of GloBE—such as Income Inclusion Rules (IIR), Undertaxed Payments Rules (UTPR), and Qualified Domestic Minimum Top-Up Taxes (QDMTT)—require advanced legal frameworks and inter-agency coordination that may not yet exist in these jurisdictions. Without significant investment in capacity-building, these countries risk being excluded from the benefits of the new global tax system, potentially losing out on much-needed revenue from large digital MNEs operating in their markets (ATAF, 2022).

To address this imbalance, international organizations and donor agencies must prioritize technical assistance and gradual implementation pathways for developing economies. Institutions such as the OECD, the World Bank, and regional tax networks like the African Tax Administration Forum (ATAF) have launched initiatives to support countries in adapting their legal frameworks and strengthening administrative capacity. Capacity-building efforts include training tax officials in international tax law, enhancing data-sharing capabilities, and developing simplified compliance tools suited to local contexts (OECD, 2022). Moreover, proposals to introduce transitional safe harbors and *de minimis* thresholds for low-revenue jurisdictions are critical to ensure that developing countries are not overburdened with compliance obligations. These measures must be implemented alongside efforts to digitalize tax administration and integrate real-time reporting systems, allowing LMICs to better track MNE activity and enforce GloBE provisions effectively.

Furthermore, the successful implementation of GloBE will depend on strong political will and regional cooperation. While the global minimum tax sets a common standard, its enforcement relies heavily on domestic legislation and multilateral agreements to ensure consistency and prevent loopholes. Countries in ASEAN, for example, must align their national tax codes and exchange information effectively to monitor MNE behavior and avoid jurisdictional mismatches. Failure to coordinate could undermine the objectives of Pillar Two and incentivize firms to exploit regulatory gaps (OECD, 2023). In this context, regional tax forums and digital economy partnerships can play a vital role in harmonizing enforcement efforts and establishing shared compliance frameworks. Ultimately, while GloBE offers a pathway toward a fairer international tax order, its success will hinge on inclusive implementation strategies that empower all countries—regardless of income level—to benefit from a more equitable distribution of taxing rights in the digital economy.

c. Tax Incentives for Technopreneurship and Innovation

1) Indonesia's Super Deduction for R&D

Indonesia has taken progressive steps to incentivize innovation by introducing a super deduction tax policy through Ministerial Regulation No. 128/2019. This regulation allows companies to deduct up to 300% of eligible research and development (R&D) expenditures from their taxable income, aiming to stimulate private-sector innovation and strengthen the national knowledge economy. The policy reflects a growing global trend in which tax instruments are used to bolster technological advancement and encourage firms to invest in long-term research initiatives (OECD, 2023). Designed to support Indonesia's broader transformation into a digitally competitive economy, the super deduction aligns with national goals under the "Making Indonesia 4.0" roadmap. The policy particularly targets manufacturing, health, and information technology sectors—areas considered vital for future economic resilience and competitiveness. In principle, this generous fiscal incentive should position Indonesia as a regional hub for innovation, fostering collaboration between academia, startups, and established enterprises engaged in R&D-intensive activities.

Despite its ambitious design, the uptake of Indonesia's R&D super deduction remains relatively low. A 2024 review by the Ministry of Finance found that only a limited number of firms had claimed the benefit, raising questions about the policy's administrative feasibility (Kristanti & Saptono, 2024). Several companies cited procedural complexity, including burdensome documentation requirements and vague definitions of qualifying R&D activities. Moreover, the absence of clear sectoral guidelines and long processing times further disincentivized businesses from participating. Unlike similar incentives in OECD countries—where advance rulings, simplified forms, and real-time advisory

services are common—Indonesia's implementation lacks streamlined mechanisms to help firms navigate the claims process. For small and medium-sized enterprises (SMEs), in particular, the cost of compliance often outweighs the perceived benefit of the deduction. These structural weaknesses suggest that while the fiscal incentive is generous in scope, it falls short in accessibility, particularly for companies without dedicated tax planning departments or legal counsel.

The best international practices suggest that the success of R&D tax incentives depends not only on the size of the deduction but also on the ease of access and legal certainty offered to businesses. In jurisdictions such as the United Kingdom and South Korea, robust support systems—including digital portals, helplines, and pre-approval processes—have led to higher participation rates across firm sizes and industries (OECD, 2021). Indonesia could benefit from adopting similar measures by simplifying application procedures, providing sector-specific examples of eligible R&D, and introducing standardized review timelines. Additionally, establishing a central coordinating body to oversee policy implementation and act as a liaison between taxpayers and regulators could improve transparency and trust. As Indonesia continues to expand its digital economy, aligning its tax incentives with business needs and global standards will be essential to maximizing the impact of public resources allocated to innovation.

In this context, improving the administrative capacity of the Directorate General of Taxes (DGT) and increasing inter-agency coordination will be critical for ensuring that the R&D super deduction achieves its intended goals. Partnerships between tax authorities, innovation ministries, and business associations can facilitate better information dissemination and create feedback loops to continuously refine the policy (UNCTAD, 2023). Moreover, disaggregated data on approved claims—by sector, company size, and project type—would enable targeted reforms and reveal areas where the policy may be underperforming. Looking ahead, Indonesia must strike a balance between fiscal prudence and innovation-driven growth. This entails not only offering competitive incentives but also fostering an innovative ecosystem supported by transparent, predictable, and business-friendly tax administration. If executed effectively, Indonesia's R&D tax policy has the potential to become a cornerstone of national technopreneurship and digital competitiveness in Southeast Asia.

2) Global Trends in R&D Tax Credits

By 2024, an overwhelming majority of OECD countries—34 out of 38—had implemented fiscal support mechanisms to promote research and development (R&D) activities, reflecting a global consensus on the importance of innovation-driven growth (OECD, 2024). Among these mechanisms, tax incentives have emerged as the dominant tool, accounting for approximately 55% of total government innovation spending. These incentives include R&D tax credits, super deductions, and accelerated depreciation for qualifying research expenditures. Governments favor tax-based support not only for its flexibility and scalability but also because it encourages private-sector investment in high-risk, high-return innovation projects. Unlike direct subsidies or grants, tax incentives are often less politically contentious and more administratively efficient, allowing firms greater autonomy in allocating resources. As the global economy becomes increasingly digital and knowledge-intensive, countries are leveraging fiscal tools to attract investment, stimulate productivity, and secure a competitive edge in emerging technologies such as artificial intelligence, biotechnology, and clean energy.

Despite the widespread adoption of R&D tax incentives, their effectiveness varies significantly across countries depending on policy design, administrative simplicity, and clarity of eligibility criteria. In high-income countries like France, Korea, and Canada, comprehensive systems—often including refundable credits, carryforward provisions, and tiered benefits for SMEs—have led to sustained increases in private R&D investment (OECD, 2021). Conversely, in several middle-income economies, uptake remains limited due to burdensome application procedures, lack of taxpayer awareness, and weak coordination between tax authorities and innovation ministries. Additionally, overly complex rules may disproportionately benefit large firms with dedicated tax planning teams, leaving smaller enterprises unable to take advantage of available incentives. This discrepancy underscores the need for more inclusive and balanced policy frameworks that support a wider range of innovators. To maximize impact, countries must align fiscal incentives with broader innovation strategies and ensure that tax policies are predictable, transparent, and accessible to all stakeholders within the innovation ecosystem.

There is also growing recognition of the need to better evaluate the cost-effectiveness and equity of R&D tax incentives. While tax credits can successfully stimulate incremental private investment in innovation, they also represent a significant fiscal cost, with limited guarantees of spillover benefits to the broader economy (UNCTAD, 2023). Many countries have begun to implement performance

monitoring systems that assess the additionality, targeting accuracy, and long-term outcomes of tax-supported R&D. These systems often track indicators such as patent filings, new product launches, employment in R&D-intensive sectors, and firm-level productivity gains. In some cases, governments have adjusted their incentive structures by capping benefits, focusing on early-stage R&D, or linking support to measurable public good outcomes. Such evidence-based refinements are essential to ensure that innovation spending delivers meaningful returns for society and avoids becoming a regressive subsidy for already well-capitalized firms. As fiscal pressures mount globally, efficient allocation of public funds through well-designed tax policies will remain a top priority.

In this evolving landscape, international cooperation plays a vital role in helping countries design and optimize R&D tax policies. Organizations such as the OECD and World Bank provide technical assistance, comparative benchmarks, and policy diagnostics to support countries in enhancing the effectiveness of their innovation tax frameworks (World Bank, 2023). Moreover, cross-border collaboration is increasingly important as multinational enterprises conduct R&D across multiple jurisdictions, raising issues related to profit shifting, intellectual property taxation, and the location of real value creation. Coordinated policies—such as rules on tax treatment of intangibles or minimum standards for R&D definitions—can help prevent harmful tax competition and ensure that incentives serve their intended economic development objectives. In sum, while R&D tax incentives have become a cornerstone of modern innovation policy, their success ultimately depends on thoughtful design, robust oversight, and international alignment to address the challenges of an interconnected and fast-changing global economy.

3) Income-Based Tax Incentives (IBTIs)

Several OECD countries have adopted income-based tax incentives (IBTIs) to foster innovation and retain intellectual property (IP)-related income within their jurisdictions. These incentives, often structured as “patent boxes” or “innovation boxes,” apply reduced corporate tax rates to income derived from qualifying IP, such as patents, copyrights, and in some cases, software or trade secrets. The primary objective of IBTIs is to encourage companies to conduct R&D activities domestically and to register and commercialize the resulting IP in the same country. By reducing the tax burden on IP income, governments aim to create a more attractive environment for high-tech industries and global innovation hubs (OECD, 2021). Countries like the United Kingdom, Netherlands, and Belgium have introduced such schemes as part of broader strategies to remain competitive in the knowledge economy. These regimes have been instrumental in attracting foreign direct investment and anchoring intangible assets that might otherwise be shifted to low-tax jurisdictions.

IBTIs are typically designed to complement input-based R&D incentives, such as tax credits or super deductions for research expenditures. While input incentives reduce the cost of innovation, IBTIs reward successful commercialization of that innovation. This dual approach supports the entire innovation value chain—from idea generation to marketable product. However, income-based schemes have drawn scrutiny for potentially facilitating base erosion and profit shifting (BEPS), as companies may exploit lenient qualification rules or shift income artificially to take advantage of lower tax rates. In response, the OECD’s 2015 BEPS Action 5 report introduced the “nexus approach,” requiring that preferential tax treatment be directly linked to substantial R&D activities conducted within the taxing country (OECD, 2015). This policy ensures that IP-related income receiving tax benefits arises from genuine local economic activity. As a result, many countries have reformed their IBTI regimes to align with international standards while preserving their ability to attract and retain innovation-oriented investment.

Despite these reforms, the effectiveness of IBTIs remains a subject of debate among policymakers and scholars. Critics argue that income-based incentives disproportionately benefit large multinational enterprises (MNEs) with significant IP portfolios and sophisticated tax planning capacities. Smaller firms and startups, which often operate at a loss during their early innovation cycles, derive little benefit from reduced taxation on profits they have not yet realized (UNCTAD, 2023). Moreover, the cost-effectiveness of IBTIs is often questioned, as they represent a form of foregone revenue with uncertain innovation spillovers. Supporters, however, contend that these incentives help retain high-value economic activities, including R&D jobs, patent management, and licensing operations, which contribute to domestic value chains. Given these mixed outcomes, some countries have started to refine their IBTI policies by introducing progressive rates, capping benefits, or combining them with targeted support for small and medium-sized enterprises (SMEs). Such adjustments aim to enhance the equity and efficiency of innovation-driven tax regimes.

As global tax rules continue to evolve, the future of IBTIs will depend on their compatibility with broader international initiatives, particularly the OECD’s Pillar Two global minimum tax framework.

If implemented uniformly, Pillar Two's 15% minimum effective tax rate could erode the advantages of preferential IP tax regimes unless such incentives are carefully integrated into domestic minimum top-up tax calculations (OECD, 2023). This poses a strategic dilemma for countries that rely heavily on IBTIs to attract foreign investment. Policymakers must weigh the benefits of these incentives against the risks of international tax friction, profit shifting, and legal complexity. In this environment, transparency, policy coherence, and administrative capacity will become crucial in ensuring that IBTIs serve their intended purpose—promoting genuine innovation—without undermining tax fairness. For emerging economies, aligning domestic IP tax policies with global norms while safeguarding fiscal space remains an especially delicate balancing act.

d. Digitalization of Tax Administration

Singapore has emerged as a regional leader in digital tax administration by adopting cross-border e-invoicing through the Pan-European Public Procurement OnLine (Peppol) network. As part of the ASEAN Digital Economy Framework Agreement (DEFA), Singapore's integration of Peppol aims to streamline business-to-government (B2G) and business-to-business (B2B) transactions by enabling standardized, real-time exchange of invoicing data (IMDA, 2023). The use of e-invoicing enhances transparency, reduces administrative costs, and improves tax compliance by minimizing manual errors and underreporting. Peppol's interoperability across borders supports regional efforts to harmonize digital commerce regulations, making it easier for small and medium-sized enterprises (SMEs) to expand internationally. By leveraging digital infrastructure to enforce compliance, Singapore demonstrates how digital connectivity and tax policy can jointly contribute to economic efficiency and regulatory modernization. These initiatives also lay the foundation for integrated tax systems across ASEAN, promoting greater economic resilience and reducing the complexity of cross-border trade documentation.

Indonesia, meanwhile, is undertaking major reforms to modernize its tax administration through the expansion of its e-Faktur (electronic invoicing) system and the overhaul of its core tax administration infrastructure. Initially launched for value-added tax (VAT) compliance, the e-Faktur platform now forms part of a broader digital transformation strategy by the Directorate General of Taxes (DGT). Indonesia's new tax core system, currently being rolled out, integrates data from e-commerce platforms, financial institutions, and third-party digital service providers to improve audit trails and enhance enforcement capabilities (Ministry of Finance Indonesia, 2024). These reforms are intended to reduce tax leakage, increase voluntary compliance, and improve real-time monitoring of taxable transactions. Importantly, the modernization effort seeks to create a tax environment better aligned with the platform-based economy, where digital transactions are dominant. This strategy not only strengthens revenue mobilization but also builds trust among taxpayers through more transparent and accountable digital processes.

The development of e-invoicing systems in both Singapore and Indonesia reflects a broader regional trend toward the digitalization of tax administration, especially in the wake of increased e-commerce activity. Cross-border interoperability, as seen with Peppol, enables more seamless information exchange between tax authorities, allowing for better detection of tax evasion and reduction of compliance costs for businesses operating in multiple jurisdictions. For Indonesia, integrating digital tax data with third-party platforms enhances enforcement without necessarily increasing taxpayer burden, as automation simplifies filing processes. These efforts align with the objectives of the ASEAN DEFA, which seeks to create a cohesive digital trade and taxation ecosystem across member states (ASEAN, 2023). Such digital harmonization will be critical as the region moves toward deeper economic integration, particularly given the growing importance of cross-border digital services, fintech, and e-marketplaces in Southeast Asia's economic landscape.

Nevertheless, successful implementation of these digital tax reforms requires sustained investment in technical infrastructure, human resource capacity, and legal frameworks. For example, while Peppol adoption is relatively straightforward in Singapore due to its strong digital governance, countries like Indonesia face more complex challenges, including legacy systems, limited bandwidth in remote areas, and diverse taxpayer profiles. Moreover, ensuring data security and taxpayer privacy must remain a priority, especially as tax authorities increasingly rely on real-time transaction monitoring and AI-driven analytics (OECD, 2022). Regional collaboration through DEFA offers a platform for knowledge sharing, standard setting, and technical assistance, enabling countries to move forward at their own pace while still achieving collective goals. As ASEAN economies deepen their digital transformation, harmonized and adaptive tax systems will play a central role in facilitating innovation, reducing informality, and strengthening regional fiscal stability.

e. Comparative Case Analysis

Indonesia has adopted a dual-pronged approach to support its digital economy by combining innovation-focused tax policies with digital transaction taxation. The introduction of a super deduction tax of up to 300% for research and development (R&D) under Ministerial Regulation No. 128/2019 seeks to stimulate private-sector innovation, particularly in emerging technology sectors. In parallel, the 0.5% final income tax on e-commerce sales, implemented through Directorate General of Taxes Regulation No. 12/2020, aims to bring informal digital transactions into the tax net. These policies have contributed to an 18% growth in tech-related patent applications between 2022 and 2024 (Kristanti & Saptono, 2024). However, despite these fiscal advances, Indonesia continues to face a significant rural-urban connectivity gap, with over 40% of rural households lacking reliable broadband (World Bank, 2024). This structural divide limits the inclusive potential of its technopreneurship ecosystem, underscoring the need for complementary infrastructure investments alongside tax-based incentives.

The Philippines has leveraged fiscal tools to support its burgeoning digital service economy, especially in the information technology and business process management (IT-BPM) sector. By offering import duty exemptions on 5G infrastructure and targeted tax credits for digital enterprises, the government has incentivized firms to adopt next-generation technologies and expand their digital operations. These reforms contributed to a 12% increase in digital service exports in 2024, with growth concentrated in cloud services, remote staffing, and software outsourcing (World Bank, 2024). The momentum has been further reinforced by the Digital Transformation Development Policy Loan (DPL), which provides funding for broadband rollout and regulatory modernization. As a result, digital infrastructure expansion has accelerated, particularly in underserved provinces. By combining tax policy with strategic public investment, the Philippines illustrates how integrated fiscal strategies can boost both technopreneurship and connectivity, making it a model for other middle-income economies seeking to develop resilient digital ecosystems.

Singapore stands out as a regional exemplar in aligning tax policy with digital innovation through a suite of advanced instruments. Its patent box regime, which offers a preferential 10% corporate tax rate on qualifying IP income, is designed to attract high-value innovation activities and retain intellectual property within its borders (OECD, 2021). Coupled with participation in the ASEAN Digital Economy Framework Agreement (DEFA) and implementation of Peppol-based e-invoicing, Singapore has cultivated a highly transparent and efficient digital tax environment. These policies helped the country capture 40% of Southeast Asia's venture capital (VC) funding in 2023, reinforcing its position as a hub for technopreneurs (UNCTAD, 2023). Moreover, the nation boasts near-universal digital infrastructure, with gigabit-speed fiber reaching over 95% of households (IMDA, 2023). Singapore's experience underscores the importance of combining incentive-based tax policy with robust digital infrastructure and smart regulatory frameworks to create a fertile ground for high-impact, export-oriented innovation.

The comparative experiences of Indonesia, the Philippines, and Singapore highlight the diverse pathways through which fiscal policy can shape national digital economies. While Indonesia emphasizes innovation incentives, its limited broadband access poses constraints on equitable technopreneurial development. The Philippines balances infrastructure subsidies and tax incentives, translating fiscal inputs into export growth and improved access. Singapore, by contrast, integrates sophisticated tax regimes and seamless digital infrastructure, enabling it to dominate regional capital inflows and scale innovation rapidly. Each model offers insights for policymakers across ASEAN: tax incentives must be part of a coordinated ecosystem that includes infrastructure, regulatory clarity, and access to capital. Additionally, regional cooperation under frameworks like DEFA can enhance interoperability and standardization, reducing administrative burdens for cross-border digital entrepreneurs. As digital economies become increasingly interlinked, smart and adaptive tax strategies—tailored to local contexts but informed by global best practices—will be critical in driving inclusive, innovation-led growth.

f. Policy Implications

To align fiscal strategies with connectivity objectives, governments should consider integrating Digital Services Tax (DST) revenues into universal broadband funding mechanisms. By earmarking a portion of DST proceeds for infrastructure investment, particularly in underserved rural and peri-urban areas, states can ensure that taxation on digital giants contributes directly to bridging the digital divide. Such an approach enhances the equity and developmental purpose of digital taxation, converting revenue into public digital goods (World Bank, 2023). Countries like India and Chile have experimented with linking digital economy taxes to ICT investment with promising results. As

emerging economies digitalize rapidly, this model offers a pathway to simultaneously promote inclusion and digital growth. Transparent governance structures—such as independent broadband funds or performance-based disbursements—can further increase the legitimacy and impact of these allocations. In effect, linking DSTs to infrastructure builds a virtuous cycle in which tax policy not only regulates digital markets but actively expands them.

To foster innovation, especially among micro, small, and medium-sized enterprises (MSMEs) and startups, countries must simplify the administration of R&D tax incentives. This includes providing advance rulings, sector-specific examples, and user-friendly portals to clarify eligibility and streamline application processes (OECD, 2021). Many firms in developing economies struggle to benefit from available tax deductions due to vague regulations and excessive compliance burdens. Singapore and Australia, for example, offer real-time advisory services and pre-approval schemes, significantly increasing uptake across firm sizes (UNCTAD, 2023). For Indonesia and the Philippines, replicating such models would help democratize access to fiscal support and unlock broader innovation potential. Additionally, embedding tax support within innovative ecosystems—such as tech parks, incubators, or cloud platforms—can further incentivize startups to invest in R&D. A simplified and accessible incentive regime not only boosts domestic innovation but also signals policy stability to foreign investors evaluating local R&D ecosystems.

The Global Anti-Base Erosion (GloBE) rules under OECD Pillar Two present an opportunity to enhance tax fairness, but their adoption in developing countries must be phased in with adequate preparation. Premature enforcement without sufficient administrative capacity may lead to compliance gaps, legal ambiguities, or unintended disincentives for foreign investment (ATAF, 2022). Governments should prioritize capacity development through international cooperation, technical assistance, and regional peer learning. Multilateral dialogue—particularly within ASEAN, the African Union, and other regional blocs—can help harmonize GloBE implementation and avoid regulatory fragmentation. Transitional arrangements such as de minimis thresholds or safe harbor rules for smaller jurisdictions would also help ease the burden during initial adoption phases. Ultimately, the goal should be to ensure that GloBE strengthens, rather than undermines, domestic revenue mobilization. The thoughtful sequencing of legal reforms, institutional upgrades, and digital integration will be essential in transforming global tax rules into sustainable development tools for the Global South.

Lastly, countries should adopt fiscal sandboxes to test and scale innovative digital tax and incentive policies. For example, temporarily exempting software-as-a-service (SaaS) and cloud-based services from value-added tax (VAT) can promote digital adoption among MSMEs, particularly in sectors like logistics, education, and agriculture (OECD, 2022). These time-bound exemptions can reduce entry costs for digital tools, stimulate local demand for digital solutions, and provide regulators with real-world data to evaluate long-term viability. Coupled with this, advancing regional cooperation through the finalization of the ASEAN Digital Economy Framework Agreement (DEFA) will be critical to harmonize cross-border taxation, digital trade standards, and dispute resolution mechanisms (ASEAN, 2023). Such coordination can reduce administrative burdens for digital entrepreneurs operating across jurisdictions, while also creating collective leverage in global tax negotiations. In sum, adaptive, inclusive, and evidence-based fiscal experimentation—grounded in regional frameworks—offers the best route to accelerate digital connectivity and innovation in emerging economies.

4. Conclusion

Tax policy, when strategically designed and implemented, holds transformative potential not only as a mechanism for revenue generation but as a catalyst for digital connectivity and innovation-led growth. This study highlights how the integration of taxation with digital economy strategies can amplify national competitiveness and foster inclusive technopreneurship. The proposed Innovation-Taxation-Fiscal-Digital Economy (ITF-DE) framework emphasizes the critical need for aligning fiscal instruments with long-term innovation goals, infrastructure development, and digital equity. Rather than viewing tax solely as a compliance burden, governments can reposition fiscal policy as an enabler of entrepreneurial ecosystems, digital market access, and global investment flows. In doing so, taxation evolves from a passive extractive tool into a proactive developmental instrument capable of driving both economic transformation and social inclusion in the digital era.

To ensure equitable participation in the digital economy, governments must modernize their tax systems to both capture and create digital value. This requires a shift toward agile, transparent, and innovation-friendly tax administration—supported by digital infrastructure, data analytics, and

cross-agency coordination. Additionally, cross-border collaboration, such as through the ASEAN Digital Economy Framework Agreement (DEFA) or OECD-led GloBE implementation, can harmonize digital tax rules and reduce regulatory frictions for digital entrepreneurs. Special attention must also be given to small and medium-sized enterprises (SMEs), whose participation in the digital economy is often constrained by access to fiscal incentives, broadband, and cloud technologies. By adopting inclusive tax policies, enabling fiscal sandboxes, and linking tax revenues to digital infrastructure investment, governments can ensure that the benefits of global digitalization are not only captured efficiently—but distributed fairly.

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