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REVIEW ARTICLE

Capturing a Digital Economy Measurement Framework for Sri Lanka

M. A. K. Sriyalatha, P. P. Lalanie and M. P. K. Withanawasam*
Department of Business Economics, Faculty of Management Studies and Commerce, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.

Abstract: The digital economy is growing rapidly worldwide, driven by advances in information and communication technology (ICT), data analytics, and platform-based business models, creating an urgent need for reliable measurement frameworks. Traditional metrics like gross domestic product (GDP) often fail to capture the impact of digital transformation, especially in developing economies. In response, this study reviews five major frameworks for measuring the digital economy: (1) an input–output approach from the Asian Development Bank (ADB), (2) digital Supply–Use Tables by the Organization for Economic Co-operation and Development (OECD), (3) the United States Bureau of Economic Analysis (BEA)'s digital economy satellite account, (4) Huawei and Oxford Economics' "Digital Spillover" model, and (5) the "GDP-B" welfare metric proposed by Brynjolfsson et al. (2019). The study critically evaluates each framework's methodology, assumptions, and limitations using a rubric with five criteria: coverage, the System of National Accounts (SNA) compatibility, data requirements, replicability, and policy usefulness. The comparative analysis finds that ADB's Input-Output (I-O)-based framework is robust and aligns well with national accounts, making it well-suited to Sri Lanka's context, while other models offer complementary perspectives (for example, GDP-B captures consumer surplus from free digital services that GDP misses). Based on these insights, it proposes a hybrid measurement model that combines ADB's structural approach with GDP-B's welfare perspective to provide both market-size and welfare views of Sri Lanka's digital economy. The paper also outlines a detailed implementation roadmap, specifying responsible agencies, data needs, and a timeline for integrating digital economy metrics into Sri Lanka's official statistics. This study tailors global best practices to a developing-country context and offers actionable recommendations. The findings will help policymakers and statisticians in Sri Lanka and similar economies systematically measure their digital economies, enabling more evidence-based digital transformation strategies.

Keywords: digital economy, measurement framework, input–output analysis, Sri Lanka, national accounts

INTRODUCTION

Digital technologies are transforming economies worldwide, blurring the lines between traditional and online economic activities. From e-commerce and fintech services to AI-driven production processes, the "digital economy" has become a significant driver of growth and innovation. Yet, policymakers have expressed concern that the impacts of digital transformation remain largely hidden in official statistics such as gross domestic product (GDP). One key challenge is definition: there is no universally agreed-upon definition of the digital economy, as the concept evolves with emerging technologies and business models. The term *digital economy* was popularized in the 1990s (initially by Tapscott in 1996) to describe an economy based on digital computing technologies. Subsequent research has proposed multiple scopes – from a narrow core of ICT sectors to a broad view encompassing all economic activities substantially mediated by digital technologies. For example, Bukht and Heeks (2018) conceptualize the digital economy in three layers: a core digital sector (industries producing fundamental digital goods and services such as hardware, software, IT services), a wider layer of digital-enabled sectors whose operations

* Corresponding author (madurangaw@sjp.ac.lk; https://orcid.org/0000-0002-3829-3748)

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critically depend on digital inputs, and a broad layer of sectors merely utilizing digital technologies. They note that because digital technologies penetrate almost every industry, delineating the digital economy is challenging. This ambiguity in definition translates into difficulties in measurement.

Theoretically, the approach is anchored in established economic measurement principles, notably the SNA, which provides a basis for integrating digital economy metrics with official statistics. It is drawn on conceptual definitions from the literature to frame the scope – for instance, the multi-layer model of the digital economy by Bukht and Heeks (2018) – thereby explicitly justifying the study's theoretical foundation and context.

Research gap

Despite the growing importance of the digital economy, official measurement in many developing countries is absent or rudimentary. In Sri Lanka, for instance, digital economic activities are not systematically tracked by national accounts; only partial indicators (such as ICT sector output or telecom subscriptions) do exist. The lack of comprehensive data on the digital economy is a critical gap that hampers effective policy design. Governments need reliable statistics on the size, growth, and components of the digital economy to inform digital infrastructure investments, education and labour force planning, and regulatory frameworks. Without such data, Sri Lanka's aspirations for digital transformation risk being guided by anecdote rather than evidence. Moreover, existing global measurement frameworks have largely been developed by advanced economies or international agencies – their applicability to a smaller developing economy remains under-examined in the literature. No study to date has synthesized lessons from these global practices to design a tailored framework for Sri Lanka's context, representing a clear research gap.

Research question and objectives

In response, this study asks: How can Sri Lanka effectively measure its digital economy using global best practices, and what steps are needed to implement such a framework within the national statistical system? To answer this question, the study pursues four specific objectives: (1) to review five major global digital economy measurement frameworks and critically evaluate their methodologies and assumptions; (2) to compare these frameworks using a structured rubric (coverage, compatibility with national accounts, data requirements, replicability, and policy usefulness); (3) to propose a hybrid measurement model suitable for Sri Lanka, combining strengths of existing frameworks; and (4) to outline a practical implementation plan for integrating the chosen framework into Sri Lanka's national statistical system.

Sri Lanka provides a compelling case study for this research. The country is experiencing a fast-growing digital ecosystem – internet usage and mobile connectivity have risen steadily, with individuals using the internet increasing by 3.9% in 2023 (above the global average of 1.8%) and mobile cellular subscriptions now exceeding the population (148% penetration). Ambitious initiatives like the "Lanka Government Network 2.0" are underway to digitize government services and interconnect agencies. Sri Lanka has set targets to expand the digital economy's contribution (estimated at ~4.4% of GDP in recent years) to much higher levels by 2030 through investments in infrastructure and start-ups. At the same time, significant challenges persist: the *National Financial Inclusion Strategy* (Central Bank of Sri Lanka, 2021) reports that cash remains the dominant payment mode – over 50% of Sri Lankans hold a debit card, yet only 14.8% use them for payments, and a mere 2% of adults own a mobile money account. International benchmarks echo these gaps; for example, Sri Lanka ranks 91st (in the "Emerging" cluster) out of 113 countries in the 2022 *Digital Money Index*, indicating substantial room to improve digital readiness. These patterns underscore the importance of measuring the digital economy which capture both its current modest scale and its potential for growth and welfare improvement. In the following sections, it first reviews the global landscape of digital economy measurement frameworks, then presents comparative analysis and findings, and finally discusses a recommended framework and implementation path for Sri Lanka.

LITERATURE REVIEW

Global frameworks for measuring the digital economy

A variety of frameworks have been developed by international organizations, government agencies, and researchers to define and measure the digital economy. This section reviews five influential frameworks – those of ADB, OECD, BEA (USA), Huawei and Oxford Economics (2017), and the GDP-B approach – and critically evaluates their methodological foundations, assumptions, and limitations. Each framework reflects a different lens on what aspects of the digital economy should be measured and how to measure them.

Asian Development Bank (ADB) Input–Output Framework

The ADB proposes a macroeconomic framework anchored in national input–output (I-O) analysis (which maps the inter-industry linkages in an economy) to capture the digital economy. This approach defines a "core digital economy" sector, encompassing industries like ICT manufacturing, software and IT services, telecommunications, and digital media, while measuring its contribution to overall GDP through both direct and indirect channels. Concretely, the ADB method involves constructing a satellite account by partitioning standard I-O tables or Supply–Use Tables to isolate digital industries (including splitting industries that are partially digital vs. non-digital). Using the Leontief inverse matrix (a standard economic tool to estimate indirect effects), it then calculates backward and forward linkages to estimate not only the direct value added of the digital sector but also its indirect impact on other sectors via intermediate demand. This yields a comprehensive measure of the digital economy's contribution to GDP that accounts for multiplier effects

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Assumptions and strengths: The I-O-based method assumes that inter-industry relationships captured in the I-O table adequately reflect the propagation of digital sector activity through the economy. It is rooted in the SNA framework, making it fully compatible with official GDP calculation practices. A key strength of the ADB framework is its ability to leverage existing national accounts data (e.g., I-O or Supply–Use tables) to produce a measure comparable across countries and time. It provides granular insights into sectoral linkages and can be regularly updated as part of national accounts exercises.

Limitations: The accuracy of this approach depends on the quality and granularity of a country's I-O data. Many emerging economies only compile I-O tables infrequently; if the tables are outdated or highly aggregated, the digital sector may be difficult to isolate. Moreover, the I-O framework captures only monetized transactions – it does not account for consumer surplus or the value of "free" digital services, nor does it directly measure productivity gains from digital technology beyond what is reflected in market prices. As the ADB notes (ADB, 2021), this I-O approach may sacrifice completeness of the digital economy concept (missing benefits not priced and new digital products whose value isn't captured in GDP) in favour of consistency and accuracy of measured linkages. Another assumption is the use of fixed I-O coefficients (linearity), which may not hold as digital technologies rapidly change production functions – emerging digital activities might not be well-captured in historical technical coefficients. Despite these caveats, the ADB framework offers a practical and SNA-aligned foundation, particularly suitable for developing countries seeking to integrate digital economy measurement into their national statistical system.

OECD Digital Supply–Use Tables (SUT) framework

The OECD's digital SUT framework aims to integrate digital transformation within national accounts by enhancing traditional Supply–Use Tables with digital classifications. Detailed in the 2023 OECD Handbook on Compiling Digital Supply and Use Tables (Ng & Edens, 2023), the approach introduces two central concepts: digital industries and digital transactions. It distinguishes sectors such as digital platforms (e.g., ride sharing or accommodation services), digital infrastructure providers (telecom, IT services), and digital content producers. It also classifies transactions as digitally ordered (e-commerce) and/or digitally delivered (streaming services), thereby capturing cross-sectoral digital activities. A key strength is its alignment with the SNA, allowing comparability across countries and ensuring no overlap or omission in GDP accounting. For instance, extending existing SUTs with digital categories enables countries to report digital economy indicators as subsets of GDP without altering national totals. Policymakers benefit from granular insights – e.g., the share of digitally delivered output in business services or e-commerce penetration in retail.

Limitations: This framework is highly data-intensive, requiring detailed firm-level information on ordering and delivery modes, platform usage, and digital activity that is often lacking in developing countries. Implementation may require new enterprise surveys, digital economy modules, or access to private-sector data. Additionally, like the ADB framework, the OECD SUT approach excludes non-market digital impacts such as consumer surplus. While methodologically robust, it is best suited for economies with advanced statistical capacities and may be challenging to implement in Sri Lanka in the short term, according to the given current data constraints.

U.S. Bureau of Economic Analysis (BEA) Digital Economy Satellite Account

The U.S. BEA has developed one of the earliest official measures of the digital economy, formalized by Barefoot et al. (2018) through the creation of a Digital Economy Satellite Account. This framework defines the digital economy around three core components or "pillars": (1) digital-enabling infrastructure, including hardware, software, and telecommunications services; (2) digital transactions (largely e-commerce and online services); and (3) digital media/content, such as software-as-a-service, digital advertising, and streaming content. The BEA approach maps relevant industries—or digital portions of industries—onto the existing national account's structure, using data from SUTs and supplemental sources. A key strength lies in its practicality: the framework yields intuitive headline indicators (e.g., digital economy as a percentage of GDP or employment) that are easy for policymakers to interpret. It leverages mostly existing data (national accounts by industry, e-commerce stats, etc.), avoiding complex modelling.

Limitations: The BEA's relatively narrow production-focused definition limits coverage. It largely captures the direct output of ICT, e-commerce, and digital content sectors, but does not account for indirect effects (no I-O multipliers) or non-market value (e.g., consumer surplus from free goods). Additionally, estimating the "digital share" within multipurpose industries requires subjective assumptions (e.g., what fraction of wholesale trade is "digital"). While effective for the US, replicability in other countries depends on the availability of similar data and industry structure. Overall, the BEA model offers a pragmatic, GDP-compatible baseline measure of digital economic activity, but it may understate the broader impacts of digitalization.

Huawei and Oxford Economics "Digital Spillover" Model

The "Digital Spillover" model by Huawei and Oxford Economics (2017) offers a distinctive approach by focusing on the broader economic impacts of digitalization rather than its direct contribution to GDP. Their report, *Digital Spillover: Measuring the True Impact of the Digital Economy* (Huawei & Oxford Economics, 2017), emphasizes how investments in digital technology (e.g., broadband infrastructure, ICT capital) generate productivity gains and long-term growth across sectors. The model employs econometric techniques and growth accounting to estimate how digital adoption influences total factor productivity. It distinguishes between direct digital value added and two spillover channels: indirect spillovers (e.g., supply chain effects) and productivity spillovers (efficiency gains in non-digital sectors due to digital adoption). The key strength of this model is its ability to capture the transformative, cross-sectoral nature of digitalization, aligning with endogenous growth theory by quantifying how digital technologies contribute to economy-wide innovation and human capital efficiency. It also highlights that traditional GDP metrics may underestimate the true economic value of digitalization.

Limitations: The spillover model is not directly compatible with national accounts and risks double-counting if one tries to integrate its results with GDP figures. Its methodology (macro-level regressions and projections) makes it less transparent and less replicable without significant expertise and data. The data requirements are high (time-series data on digital investments, usage, etc.), and results can be sensitive to model specifications and context. In practice, this approach has been more of a one-off research exercise; it is not institutionalized by statistical agencies. Thus, while the spillover model provides valuable strategic insights, it serves best as a complementary perspective rather than a framework for official digital economy measurement.

"GDP-B" Welfare Metric

Brynjolfsson et al. (2019) introduced GDP-B, an alternative metric that extends national accounts to include the benefits of new and free digital goods. This framework arises from the observation that many digital products (search engines, social media, mobile apps) are offered to consumers at zero monetary price, meaning their value is not captured by GDP, which counts only paid transactions. GDP-B addresses this gap by measuring the consumer surplus or utility that individuals derive from such free digital services. Methodologically, Brynjolfsson et al. (2019) conducted large-scale online choice experiments asking people how much compensation they would require to give up specific digital services for a period. This elicits an implicit value for the service on behalf of consumers. For example, if the median person needs $500 to forgo access to search engines for a year, that suggests a significant welfare benefit not captured in market prices. GDP-B proposes adding the imputed value of these free digital services to conventional GDP to reflect overall economic welfare more effectively.

Assumptions and strengths: GDP-B explicitly takes a welfare economics approach, if willingness-to-accept compensation is a valid measure of consumer surplus from digital goods. It uses a bottom-up microeconomic methodology to monetize the utility of digital services. The strength of this approach is its unique insight into areas ignored by production-based metrics: for instance, even if social media contributes little to GDP (mostly via advertising revenue), it provides enormous consumer satisfaction that GDP-B attempts to quantify. This helps explain the "productivity paradox" of the digital era – significant consumer benefits from digital innovations that do not show up in GDP or productivity statistics. By supplementing GDP with a GDP-B figure, policymakers gain a more comprehensive picture of economic progress, especially in countries where citizens heavily rely on free digital platforms.

Limitations: The GDP-B framework diverges from standard national accounts, effectively creating a parallel indicator of "digital welfare" outside the production boundary. This raises compatibility issues with the SNA – GDP-B is not an official extension of GDP, but a separate complementary metric. Incorporating it into official statistics would be conceptually controversial and technically challenging, as consumer surplus is generally outside the scope of the GDP. Additionally, GDP-B relies on survey-based contingent valuation methods along with well-known uncertainties in which the responses can be sensitive to survey design and hypothetical bias, and valuations may vary widely across individuals and cultures. The assumption that one can obtain a stable, representative dollar value for each free good is tenuous. There is also potential overlap – for example, the value people assign to internet search might overlap with the value of social media – risking some double-counting. Finally, replicability is limited as implementing GDP-B requires considerable expertise in experimental economics and access to large, representative panels of respondents. To date, GDP-B has been tested primarily in research settings (e.g., the US and Europe), and no national statistical agency has officially adopted it.

METHODOLOGY

To systematically compare the digital economy measurement frameworks identified in the literature, this study employs a qualitative multi-criteria analysis. No primary data were collected for this review; instead, information is compiled on each framework from its original publications (e.g., ADB, OECD, and BEA reports) and gathered country-specific digital economy statistics from existing reports and databases (for example, Central Bank of Sri Lanka, 2021, for financial inclusion data). An evaluation rubric is developed consisting of five criteria that are pivotal for a measurement framework's usefulness in a policy context, especially for a developing economy. The criteria, derived from recurring themes in the literature and the needs articulated by policymakers for actionable statistics, are defined as follows: Coverage – the extent to which the framework captures the breadth of the digital economy. SNA-Compatibility – the degree of alignment with the System of National Accounts and standard GDP measurement (reflecting whether the framework's methodology can be integrated into official national accounting practices). Data Requirements – the nature and amount of data needed to implement the framework, and the ease or difficulty of obtaining data. Replicability – how easily the framework can be replicated by other countries or agencies, in terms of methodological complexity and generalizability. Policy Usability – the practical utility of the framework's outputs for policymakers (for example, whether the framework yields clear, interpretable metrics such as a single GDP contribution percentage or employment figures that decision-makers can readily use).

Using this rubric, each of the five frameworks was assessed based on detailed characteristics documented in the literature (as reviewed in the previous section). We synthesized qualitative judgments into a simple score from 1 to 5 on each criterion (5 = *very high/good*, 1 = *very low/poor*) to facilitate comparison. These scores are necessarily subjective but were grounded in evidence from source studies and expert judgment. This approach allows us to identify which framework (or combination of frameworks) might be most suitable for Sri Lanka, given the country's needs and constraints – an issue we explore in the discussion.

ANALYSIS AND COMPARATIVE EVALUATION

Applying the above criteria to the five measurement frameworks yields a differentiated view of their strengths and weaknesses (Table 1). Table 1 summarizes the scores, and each criterion is discussed in depth below, with supporting evidence and context for the scores.

In terms of coverage, the ADB (2021), OECD, and Huawei and Oxford (2017) frameworks score highly (4 out of 5), though they achieve broad coverage in different ways. The ADB's I-O model captures both the direct output of digital sectors and their inter-industry linkages, effectively including indirect contributions. This provides a more complete picture of how digital inputs drive output across traditional sectors. The OECD's Digital SUT framework offers perhaps the broadest conceptual coverage by classifying transactions across all sectors as digitally ordered or digitally delivered. This means it can identify digital activity not only in core ICT sectors but also within "traditional" industries — for example, e-commerce in manufacturing or ride-hailing in transportation — thus spanning the economy horizontally. Huawei and Oxford's model expand coverage in a *temporal* dimension by incorporating long-run productivity spillovers from digital adoption across sectors. While this approach captures broader macroeconomic impacts of digitalization, it emphasizes aggregate outcomes (economy-wide growth) rather than granular sectoral details. In contrast, the BEA framework

Table 1

Summary of the Rubric Scores

Framework	Coverage	SNA compatibility	Data requirements	Replicability	Policy usability
ADB (Input–Output)	4	5	3	4	5
OECD (Digital SUT)	4	5	2	2	4
BEA (USA Digital Econ.)	3	5	4	4	5
Huawei and Oxford (Spillover)	4	2	3	2	3
GDP-B (Welfare Metric)	2	1	1	1	2

Note. Scores are based on qualitative assessment of each framework's performance on the criteria, as explained in the text.

provides moderate coverage (score 3), focusing mainly on core ICT industries, e-commerce, and digital media/content, without accounting for indirect effects or the digital transformation happening within non-ICT sectors. GDP-B ranks lowest (score 2) on coverage, as it narrowly targets consumer surplus from a subset of free digital services, excluding broader production and infrastructure aspects of the digital economy. In summary, while wider coverage yields richer insights, it also introduces complexity and data challenges.

For SNA-compatibility, the ADB, OECD, and BEA frameworks each earn the highest score (score 5) because they are firmly grounded in SNA principles and can be integrated into standard GDP estimation or satellite accounts. For example, the OECD's Digital SUT framework extends existing national accounts tables by adding digital dimensions, allowing countries to report digital economy indicators as a component of GDP without double-counting or altering total GDP. Similarly, the ADB's I-O-based approach builds on national accounts data (IO tables), estimating the value added from digital sectors and their linkages in a way that aligns perfectly with how GDP is measured (since total value added in an I-O table equals GDP). The BEA's digital economy account is also fully SNA-consistent, essentially reorganizing standard GDP-by-industry data to isolate the digital portion. By contrast, the Huawei and Oxford (2017) "spillover" model scores much lower (score 2) on compatibility: and it does measure some direct digital GDP, its additional productivity estimates lie outside the formal production boundary, so they cannot be included in official GDP without risking double-counting or violating SNA rules. GDP-B is the least compatible (score 1) since it introduces non-monetary "imputed" values for consumer benefits, which are entirely outside GDP's production boundary. For a country like Sri Lanka, high SNA-compatibility is essential if the goal is to institutionalize digital economy metrics within official statistics.

Data requirements vary significantly across frameworks and are a crucial factor for practical implementation. The BEA framework scores relatively high (score 4) in feasibility, as it mainly relies on data that many countries (potentially including Sri Lanka) already collect, such as national accounts by industry, existing ICT sector output, e-commerce sales, and so on. Implementing a BEA-like approach might require only modest extensions to surveys (for example, adding questions to capture digital sales or digital employment in certain industries). The ADB framework is rated moderate (score 3) on data requirements. Most countries have some form of I-O or SUT data, but the ADB approach needs further disaggregation of those tables to distinguish digital versus non-digital activities, which may require supplemental data from industry studies or surveys. Also, I-O tables are not produced frequently in some countries and updating them or increasing their detail can be resource-intensive. Nonetheless, the ADB approach does not demand fundamentally new data types—just reorganizing and refining existing data, which is a plus. The OECD's Digital SUT framework is data-intensive (score 2). It demands detailed firm-level and transaction-level data on how goods and services are ordered and delivered (e.g., identifying which transactions in each industry are digital). Developing countries typically lack this depth of data, so implementing the OECD method would likely require new data collection efforts such as dedicated enterprise surveys, expanded ICT use surveys, and access to platform economy data. The Huawei and Oxford (2017) model has moderate data requirements (score 3) because it needs macroeconomic time-series data (for econometric analysis) such as ICT investment figures, broadband penetration rates, etc., which are available to some extent but may not be very granular or fully reliable in all countries. GDP-B has very high data demands relative to what statistical offices normally do (score 1). It requires designing and fielding specialized surveys or experiments to measure consumer willingness-to-accept for various digital services. This is not part of regular statistical operations and would be a significant undertaking for an agency like Sri Lanka's. In short, frameworks that rely on standard economic data (like BEA, ADB) are easier to implement with existing data systems, whereas those needing detailed digital-specific or experimental data (OECD SUT, GDP-B) present bigger challenges.

Replicability considers both data demands and methodological complexity, as well as the extent to which an approach has already been tried elsewhere (providing a template to follow). The BEA and ADB frameworks score highly (score 4) on replicability because they use relatively straightforward methodologies backed by institutional support. The BEA's methodology has been adopted or studied by several other countries and institutions (for instance, the International Monetary Fund and World Bank have referenced the BEA approach when advising countries on digital economy metrics). Its step-by-step structure (identify relevant industries, use existing stats to calculate digital contributions) is familiar to statistical agencies that manage national accounts. Similarly, the ADB's IO-based framework, while more technical in terms of calculating multipliers, has been piloted in other contexts beyond the original proposal – for example, ADB and partners have applied it in countries like India – and it comes with detailed documentation to guide implementation. The necessary technical skills (IO analysis) are available or teachable in many countries. In contrast, the OECD's Digital SUT framework scores low (score 2) on replicability. Despite a published handbook, as of 2025, it has seen only limited implementation in a few advanced economies. Its complexity and heavy data needs make it hard to replicate in developing countries until simplified methods or tooling are developed. The Huawei and Oxford (2017) spillover model also rates low (score 2) as it was essentially a one-off study requiring advanced econometric modelling and significant country-specific data work, which few statistical offices could easily replicate. GDP-B is lowest (score 1) as no national statistical agency has institutionalized it. It remains a research concept tested in academic settings. For Sri Lanka, proven, replicable models like BEA and ADB offer stronger starting points.

Regarding policy usability, we evaluate how informative and actionable each framework's outputs are for decision-makers. Both the ADB and BEA frameworks score the highest (score 5) in this dimension, albeit for slightly different reasons. The ADB's I-O-based model generates rich indicators such as the digital economy's direct and indirect contribution to GDP, and even sectoral multipliers show which industries benefit most from digital inputs. These outputs allow targeted policy insights (e.g., identifying high "digital multiplier" sectors to prioritize for digital investment) and can also simulate potential impacts of policy changes like expanding broadband and seeing effects on other sectors. The BEA framework, while narrower in scope, produces very straightforward metrics that align with common policy questions: for example, what share of GDP is the digital economy, how many jobs does it account for, and how fast is it growing. These headline numbers (digital GDP percentage, digital economy growth rate, etc.) are easily communicated and can be directly inserted into policy documents and targets. Moreover, because they can be updated regularly and compared internationally, they help in benchmarking progress. The OECD's Digital SUT framework scores slightly lower (score 4) on usability. Its detailed data can support nuanced policies (like identifying specific industries where digital transactions lag, to guide interventions in digital trade or digital skills programs). However, the very complexity that gives it depth can also make it harder for non-specialist policymakers to digest – the data might need to be distilled into simpler indicators for broad communication. Huawei and Oxford's model (2017) get a moderate score (score 3) on usability. It is valuable in underscoring long-term strategic benefits of digital adoption (which can support high-level digital investment policies), but its outputs (like percentage-point contributions to total factor productivity [TFP] growth) are not standard indicators that a finance minister or planning commission might track annually. GDP-B also scores low (score 2) on direct usability for policy. While it yields insight into consumer welfare, which is important, it doesn't translate into a traditional economic indicator that policymakers are accustomed to, and it might be seen as an experimental figure. In summary, frameworks closely tied to GDP and employment (ADB and BEA) tend to produce the most immediately usable metrics for governments, whereas the others, while insightful, may require extra effort to incorporate into policy evaluation processes.

In summary, this comparative analysis shows that no single framework excels on all criteria, which is not surprising, as each was designed with different goals in mind. However, the ADB and BEA frameworks emerge as especially strong models for practical implementation in a country like Sri Lanka as they are SNA-compatible, relatively easier to implement with existing data, and yield results that policymakers can readily understand and use (hence their high scores in Table 1). The OECD framework, while conceptually comprehensive, poses data and complexity challenges that might put it out of reach in the short term for Sri Lanka – though it provides a direction for future enhancement as data capabilities improve. The Huawei and Oxford (2017) and GDP-B approaches contribute unique perspectives (macro-growth and welfare, respectively) that are largely missing from the others, but their shortcomings in compatibility and feasibility mean they would serve better as complements rather than stand-alone solutions. These comparative insights lay the groundwork for the recommendation to combine elements of different frameworks in a hybrid model that leverages their strengths while mitigating their weaknesses. In the next section, it proposes a hybrid measurement model tailored to Sri Lanka and then details how it can be operationalized through a step-by-step implementation plan.

DISCUSSION AND POLICY IMPLICATIONS

Proposed hybrid measurement model for Sri Lanka

The above analysis recommended a hybrid measurement framework for Sri Lanka's digital economy that integrates the structural strengths of the ADB input–output approach with the welfare-sensitivity of the GDP-B concept. The rationale for this combination is to provide policymakers with a two-dimensional view of the digital economy: (1) its contribution to conventional economic output and linkages (for which the ADB methodology is well-suited), and (2) its contribution to consumer welfare beyond what GDP captures (addressed by a GDP-B–style metric). This hybrid model aims to be SNA-compliant and data-feasible on the one hand, while augmenting the picture with non-market digital benefits on the other.

Core output measure (ADB-style)

The backbone of the framework would be an ADB-type digital economy satellite account built from Sri Lanka's national accounts. Practically, this involves identifying the relevant industries and products in Sri Lanka's supply–use tables that constitute the "digital sector." Based on international practice and local context, this core would likely include industries such as telecommunications, computer programming/IT services, electronic media, and portions of trade and manufacturing that produce or heavily use digital goods (for instance, electronics manufacturing and perhaps a share of financial services attributable to digital banking). Using input–output analysis, Sri Lanka can estimate both the direct value added of this digital sector and its indirect value added generated through inter-industry demand. The result could be an annual estimate such as, "In 2024, Sri Lanka's digital economy (direct + indirect) contributed LKR X billion, which is Y% of GDP." This addresses the fundamental policy question: *how big is the digital economy and how fast is it growing?* It also allows decomposition by component industry, giving insight into which parts of the digital sector are driving growth. Importantly, as this measure aligns with SNA, these numbers could be officially published by the Department of Census and Statistics (DCS) with credibility, and these can be compared internationally (e.g., through ADB's comparative statistics across Asia). The ADB-style measure is also flexible and can be expanded over time – for example, if better data on platform-mediated services become available, those can be incorporated as part of the digital sector in the I-O tables. Thus, it provides a "plug-in" structure that can evolve. For Sri Lanka, an additional benefit of the I-O approach is that it highlights which traditional sectors benefit most from digital inputs, informing industrial policy (e.g., if the hospitality sector shows strong linkages to digital services like online travel platforms, then supporting digitalization in tourism could have significant multiplier effects).

Welfare augmentation (GDP-B style)

To complement the above, the hybrid model would include a supplementary indicator capturing digital welfare gains. We propose that Sri Lanka initially focus on a small number of widely used free (or consumer-subsidized) digital services to pilot a GDP-B approach. For instance, social media usage, search engines, and communication apps are good candidates, as they have broad penetration in Sri Lanka yet are provided to consumers without any direct fees. A structured survey or experiment can be conducted (potentially in collaboration with a university or using online panels) to estimate how much value Sri Lankan users derive from these services. For example, a survey could ask a sample of internet users: "How much compensation would you require to give up WhatsApp for one month?" and similarly for Google search, Facebook, YouTube, etc. By extrapolating the results to the national user base, statisticians or researchers can estimate an annual monetary value of these services to Sri Lanka. The outcome might be an aggregate figure like, "Consumer digital welfare from selected free services is approximately equivalent to LKR Z billion, adding about W% of GDP in extra utility." This welfare indicator would not be merged with official GDP but reported alongside it. Presented side-by-side with the official digital economy contribution, it offers important context – for example, even if the measured digital sector is said 5% of GDP, the *experienced* importance of digital technologies to people's lives might be higher when free services are accounted for. This has policy relevance where it underscores the societal value of digital infrastructure (i.e., people greatly value internet access and apps), which could guide the government to prioritize digital inclusion, digital literacy, and network expansion as social priorities, even if the immediate GDP contributions seem modest. Over time, Sri Lanka could broaden this welfare assessment to other areas as appropriate – for instance, the value of digital navigation services, or the value of online education content – depending on which digital goods become significant to welfare in the local context. Incorporating a GDP-B element ensures the measurement framework does not lose sight of consumer experience, which is crucial because much of digital innovation is aimed at improving quality of life rather than just increasing output.

Integrating the hybrid model

The two components – the GDP-based satellite account and the GDP-B welfare metric – would be produced in parallel and reported together, perhaps in an annual "Digital Economy Report" or as part of Sri Lanka's official statistics releases.

Sri Lankan policymakers would benefit from this dual approach. The core GDP-linked metrics directly inform traditional economic planning and comparisons (ministries often set targets for GDP growth, sectoral contributions, etc.), while the welfare metrics inform areas like telecom pricing and social policy (for example, understanding that affordable internet yields high consumer benefit, or that improving digital access can significantly enhance welfare). Notably, the hybrid model resonates with Sri Lanka's development priorities: the country's National Digital Policy emphasizes not just the growth of the ICT industry but also digital inclusion and citizen welfare through e-government and digital education. By measuring both economic and welfare dimensions, the proposed framework aligns with these multifaceted goals.

CONCLUSION

This study addresses the pressing question of how to measure the digital economy in a developing-country context, as in Sri Lanka. Through a comprehensive review of global frameworks and a structured comparative analysis, the strengths and limitations of existing approaches are identified, and a tailored solution is formulated. The research highlighted that the digital economy is a multi-dimensional phenomenon in which no single metric can fully capture its size, growth, and its impact. Consequently, a combination of methods is necessary to obtain a holistic understanding. A hybrid measurement framework that blends an input–output-based accounting of the digital sector's GDP contribution with an experimental welfare metric to account for the value of free digital services is proposed. This hybrid model leverages the compatibility and reliability of the ADB and BEA approaches while incorporating the innovative perspective of Brynjolfsson et al. (2019) GDP-B to reflect consumer benefits beyond market transactions.

By clearly delineating five evaluation criteria, the analysis provided a transparent basis for choosing this hybrid approach. For instance, the emphasis on SNA-compatibility ensures that Sri Lanka's digital economy statistics can be institutionalized within official national accounts – a crucial factor for sustainability and credibility. At the same time, recognizing the coverage gaps in traditional GDP metrics led to the inclusion of the GDP-B component, acknowledging findings that digital technologies confer significant non-monetary value to consumers. The result is a framework that speaks to both economic output and quality of life, aligning with a modern policy vision that values inclusive growth. This approach is particularly relevant for developing economies, where digital adoption can leapfrog certain development stages and bring out-sized welfare improvements (for example, mobile internet access enabling education and health services in remote areas) that are not immediately evident in GDP.

The study's recommendations are grounded in practical feasibility. This is a detailed, step-by-step implementation roadmap for Sri Lanka, which is one of the key contributions of this paper. This roadmap translates theory into action, outlining the necessary institutional coordination (among DCS, Central Bank, Information and Communication Technology Agency [ICTA], etc.), the data collection strategy (integrating new survey modules and leveraging existing data), and a realistic timeline that acknowledges capacity constraints. By specifying roles and timelines it is expected to reduce the "execution gap" and to upgrade the availability of statistics. The roadmap also emphasizes iterative learning – starting with pilot estimates, refining methods, and scaling up – a prudent strategy for innovating within official statistics. It anticipates that the process of implementing these measures will build valuable capacity within Sri Lanka's statistical system, in areas such as I-O analysis, ICT surveys, and valuation techniques.

From a policy perspective, once operationalized, these measurements will equip Sri Lankan officials with evidence to guide digital economy development. For instance, if data reveal that the digital economy contributes 5% of GDP and is growing at 10% annually, that would justify policies to support that momentum (such as investing in ICT infrastructure or technology parks). If certain sub-sectors (like digital finance or e-commerce logistics) show weaker growth, targeted interventions could be designed to address bottlenecks. The welfare metric may reveal, hypothetically, that the average Sri Lankan derives benefits from the internet equivalent to several percent of income – a powerful argument for expanding affordable internet access and digital literacy as a social priority. Furthermore, regular reporting on the digital economy can improve policy accountability in which the government can set concrete targets (e.g., doubling the digital economy's size in five years) and track progress transparently, similar to how metrics like the unemployment rate or export growth are used to evaluate performance.

Despite its contributions, this study has certain limitations that should be acknowledged. First, the framework comparison and scoring were based on qualitative judgments and available literature rather than empirical testing. The scores, while grounded in evidence, remain subjective and have not been statistically validated. Additionally, the proposed hybrid framework is conceptual and has not yet been implemented with real data in Sri Lanka, meaning its practical effectiveness and any unforeseen challenges will only become evident in execution. There are also practical capacity constraints – for example, successfully adopting the OECD or GDP-B elements may require significant improvements in data collection and technical expertise within national agencies. However, by outlining these needs in the implementation roadmap, it hopes to guide policymakers on where to invest in capacity building (such as developing enterprise surveys for digital activity or partnerships with researchers for welfare valuation studies). In terms of implications, the adoption of this framework could greatly enhance evidence-based policy-making. It would help identify priority areas for digital infrastructure investment, education, and regulation by revealing which segments of the digital economy are thriving and which are lagging. Finally, there are rich opportunities for future research – for instance, pilot-testing the hybrid model with actual Sri Lankan data to refine the methodology, exploring how digital economy contributions evolve with policy changes (dynamic analysis), and examining the framework's applicability to other developing countries for comparative insights. By addressing these limitations and pursuing these future directions, researchers and practitioners can further strengthen the measurement of the digital economy and its integration into development policy.

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