

# The Impact of Sustainability Accounting Models on Service Management in Digital Companies: A Grounded Theory and Cross-Case Comparison

## Abstract

**Objectives:** The integration of sustainability accounting into service management is increasingly critical for digital companies seeking to balance financial performance with environmental and social responsibility. This study investigates how sustainability accounting models influence service management strategies and how ESG (Environmental, Social, and Governance) indicators impact digital service performance and quality.

**Methods:** Employing a two-phase qualitative design grounded in Corbin and Strauss's (1990) Grounded Theory and supplemented by a structured Cross-Case Comparison, we conducted 44 semi-structured interviews across three leading Iranian digital firms—one each in e-commerce (17 interviews), fintech (12 interviews), and telecommunications (15 interviews). Snowball sampling was used to recruit senior managers, sustainability officers, and service-operations leads until theoretical saturation was achieved in each case. Data collection involved 60–90-minute interviews guided by an evolving protocol, and analysis proceeded through open, axial, and selective coding, with analytic memos ensuring iterative refinement of emerging categories.

**Results:** Our findings generated a substantive grounded theory model comprising two core phenomena—Embedded Sustainability Accounting in Service Operations and the ESG-Driven Service Performance Feedback Loop—under which eight causal conditions, seven intervening conditions, nine contextual conditions, six strategic actions, and six consequential outcomes were identified. Cross-case matrices surfaced both common mechanisms (real-time ESG dashboards that trigger operational decisions) and specific configurations (green-shipping SLAs for e-commerce versus energy-overlay dashboards in telecommunications) usable by managers. Strategic interventions such as integrated ESG dashboards, cross-functional sustainability teams, and ESG-infused Service-Level Agreements were deemed critical levers for translating sustainability data into service improvements.

**Conclusion:** The study has established that sustainability accounting models act as a core driver of innovation in service management, particularly in managing digital firms, with byproducts that are measurable in terms service reliability, customer satisfaction, resource efficiency, stakeholder trust and reduction of environmental impact. Cross-case comparison further highlights how far regulatory environments, technological maturity, organizational culture and governance structures modulate these effects across sectors. It enriches theory with an improved framework linking Accounting and IT Service research; Practically provides Digital practitioners with actionable guidance to embed ESG metrics into their Service Operations.

**Keywords:** Sustainability Accounting; ESG Indicators; Service Management; E-Commerce

## 1. Introduction

In the last few years, the fast-digital change has led firms to look again at old accounting and reporting systems to add sustainability aspects. This way, they improve value creation for the long term not just in financial terms (Guandalini, 2022; Pierli et al, 2023; Wu et al., 2024). These digital firms which use service-based business models and online platforms are now key players in the world economy. Hence there is a need for new ways to manage Environmental, Social and Governance (ESG) issues within these firms' management processes so that they become part of the normal flow work (Guandalini, 2022; Yang et al., 2024). The concept of sustainability accounting has evolved to fulfill this need, offering organized methodologies for corporations to measure, report, and assure non-financial performance in relation to the ESG

spectrum (Sood & Özen, 2024; Lodhia et al., 2025). In particular, emerging models of sustainability accounting are aimed at aligning the decision-making process at the operational level with societal objectives in general- this is a change from retrospective evaluation of performance to proactive risk management and strategic planning (Owusu & Ofori-Owusu, 2024).

Big data analytics, blockchain, and artificial intelligence not only make possible further automation and accuracy of activities related to sustainability reporting but also transparency in the whole process, allowing collection of data to be done in real time and leading to better assurance mechanisms (Lodhia et al., 2025). This would mean digital tools that have now made it possible to broaden management control systems by which organizations can more closely monitor sustainability indicators and put ESG considerations within the framework of standard business operations (Feroz et al., 2021; Ray & Hardi, 2024). The literature has thus far presented very substantial discrepancies regarding the adoption of practices in sustainability accounting due mainly to factors such as organizational size, industry characteristics, regulatory environment, and stakeholder pressure (Tettamanzi et al. 2022). While regulatory initiatives and investor demands have made ESG disclosure” a key part of corporate strategy, the dynamic interplay between sustainability accounting and service management has not yet been fully examined” (Del Gesso & Lodhi, 2025). Further, it translates ESG metrics into actionable insights for service delivery because its offerings are mostly intangible and the digital ecosystems are complex in nature” (de Villiers et al, 2021).

Service management in digital contexts focuses on designing, delivering, and continuously improving services to meet customer expectations. Customer expectations can be associated with several dimensions of electronic service quality frameworks like E-S-QUAL and eTailQ that cover efficiency, fulfillment, system availability, privacy, and responsiveness (Parasuraman et al., 2005; Wolfinbarger & Gilly, 2003). These dimensions of quality are the most chargeable to digital companies about customer satisfaction and therefore must sustain a competitive advantage through perceived value in maintaining satisfaction and loyalty (Aldaarmi, 2024). But, old styles of managing services have mainly looked at how well things work and the experience people have, without carefully adding sustainability factors or ESG measures into the evaluation of service performance (Parasuraman et al., 2005; Elibol, 2024). This allows digital companies to fine-tune their service delivery steps but miss the environmental impact, social effects, or governance dangers linked with what they do; this can lead to possible gaps between corporate sustainability objectives and how services are managed (Gil & Montoya, 2021).

While a lot of research has been done on how the management control system can apply to support CSR strategy and sustain actions by using the levers of control framework, such efforts have largely targeted the traditional manufacturing and service sectors. The digital service environments have been completely neglected (Arjaliès & Mundy, 2013; Nie et al, 2024). It is in this regard that sustainability accounting models have driven strategic decision-making in areas such as carbon accounting, integrated reporting, and sustainability balanced scorecards that literally tell nothing about its impact on service management in digital companies (Gil & Montoya, 2021; Weshah, 2024). This gap is large considering that digital companies by their nature generate and consume vast amounts of data thus presenting unique opportunities to harness ESG data for service personalization demand forecasting and stakeholder communication (Guandalini, 2022; Pierli et al., 2023). The heterogeneity of the frameworks— from global reporting initiatives to industry-specific ESG scorecards—introduces complexity in their application to service management because digital companies have to deal with different standards, quality of data, and requirements for assurance (Tettamanzi et al., 2022). The absence of standardized rules for incorporating ESG metrics into electronic service quality assessments prevents the possible alignment of the objectives of service management with

sustainability in the broader sense, which could undermine stakeholder trust and thus also limit strategic value ESG reporting can have (Pierli et al., 2023; Wang & Hou, 2024). In addition, the rapidly evolving digital environment-platform economies, gig workforces, ecosystem partnerships—requires adaptive accounting models that can capture the multi-dimensional nature of service delivery as well as accountability in environmental, social, and governance domains (Guandalini, 2022; Lodhia et al., 2025).

From these views, the major issue for digital firms is having no joined-up system that regularly links sustainability accounting models with service management performance indicators to support sustainable service strategies. This gap stops digital companies from being able to turn ESG information into internal gains, deal with sustainability-related dangers in how they provide services, and share believable reports on sustainability performance (Arjaliès & Mundy, 2013; Tettamanzi et al., 2022). Therefore, there is doubt about how good current practices in sustainability accounting are at pushing real improvements in digital service activities—like less environmental harm, more social value, and strong governance—nailed down (Gil & Montoya, 2021; Ding et al., 2024).

Furthermore, the challenge is made more complicated by the ever-changing nature of digital services, where updates are regular and sustainability metrics development is user-generated, making it even more difficult to measure and report sustainability metrics. This calls for new ways to relate environmental, social, and governance performance to dimensions of service reliability plus user experience and value co-creation processes (Sepetis et al., 2024; Zhang, 2024). Without such empirical evidence on the causal relationships between inputs of sustainability accounting and outcomes of service management, digital firms will have no guidance on how to proceed in an actionable way to optimize both financial performance and ESG outcomes simultaneously. Thus, resources may be allocated ineffectively leading to stakeholder dissatisfaction (Chen & Zhang, 2024).

Thus, this study tries to see how sustainability accounting models affect the management practices in digital service companies. It wants to create a theoretical framework and real-life examples that explain how ESG accounting shapes service strategy, operations, and performance evaluation. By looking into this issue, the research wants to help build a solid understanding of sustainability accounting in digital settings while giving practitioners strong tools to match service management goals with sustainability needs. This will help ensure the sustainable development of digital service ecosystems. From this, the specific objective of the study is listed below:

- How do sustainability accounting models influence the service management strategies of digital companies?

## **2. Literature review**

Sustainability accounting models have emerged as models that are very essential for digital companies to operate their practices on the sustainable level of aligning with the environmental, social, and governance (ESG) factors (Camilleri, 2025). This incorporates both financial and non-financial information about an enterprise, creating a total picture of sustainability performance in an organization which subsequently leads to enhanced decisions and allocation of resources. The discussion is based on an appraisal of service management through the perusal of several contemporary research papers. Cloud computing, big data, artificial intelligence, and Internet of Things are digital technologies that have transformed sustainability accounting and reporting. These enable finance and non-finance information to be collected, processed, and reported accurately and efficiently. For example, cloud computing would enable data on sustainability to be integrated from different departments while AI would make the reports on sustainability accurate because it will analyze data (Petcu et al., 2024; Vărzaru, 2022; Tripathi et al., 2024).

Environmental accounting and CSR, when integrated with digital platforms, has proven to make the process of transparency, efficiency, and effectiveness of sustainability reporting much better. These platforms enable firms to monitor environmental impacts as well as manage their CSR programs in an organized manner. It will also give a company better standing regarding the fulfillment of stakeholder demands about environmental accountability (Aqila & Sisdiyanto, 2025). The results of prior investigations have led to the conclusion that digital transformation has a meaningful effect on the performance of ESG which leads to environmental sustainability. For instance, in the hotel industry, results show that digital transformation in accounting and sustainable management underlies a positive influence on ESG performance; hence it supports environmental sustainability practices (Saputra et al., 2024).

Green accounting is the environmental and social integration of a company's financial reporting system. It can be viewed as an enabler that supports green businesses to transform sustainably by allowing firms to identify, measure, and report on the environmental impacts of their business activities. Green accounting will also ensure the establishment of sustainability performance indicators comprehensively based on environmental aspects that can be used by companies as targets and in tracking progress (Soraya et al., 2024; Putra et al., 2024).

The efficacy of digital accounting systems in boosting sustainable business model innovation has been looked at in recent studies. These have been rated positive for their impact on sustainable business model innovation with the digital business ecosystem mediating it. This implies that through the digital accounting systems, innovation in practices for managing environmental services would be geared up (Huy & Phuc, 2025).

Green accounting acts as a moderator between digital innovation and the performance of sustainability, leading to positive outcomes. Results from this study showed that in the industrial sector, green accounting strengthens the effect digital innovation has on sustainability performance. In other words, it places an emphasis on using green accounting to integrate with digital innovation to further drive sustainability (Lisnawati et al., 2024). Environmental Management Accounting (EMA) integrates environmental and financial information in helping support sustainable development. Digital transformation together with business intelligence systems steers manufacturing companies towards achieving better sustainability performance through prioritizing digitalization themselves (Latif et al., 2023).

Digital knowledge and performance have been integrated such that the impact on sustainability accounting, reporting, and assurance is said to be transformative. AI, blockchain, IoT, big data and other such technologies would enhance corporate accountability, transparency, and sustainability through process automation and accuracy of data resulting in better ESG reporting support as well as circular economy initiatives and strategic decision-making support for economic, social environmental sustainability (De Silva et al., 2024).

Digital transformation can enhance corporate sustainability by improving internal total factor productivity and optimizing external financial allocation efficiency, thus driving ESG performance improvement in companies. The digital transformation, effect of improvement on corporate ESG performance has been found to be more prominent in state-owned enterprises, non-heavily polluted industries, and central and western regions (Li & Zhao, 2024).

The adoption of the Smart Green Balanced Scorecard System (SGBSC) has been known to improve Digital, Environmental, Social, and Governance Performance (DESGP); it creates a mediating effect on the linkage between sustainability accounting information systems and DESGP, which eventually culminates in positive results for both the establishment and operationalization of DESG (Pham & Vu, 2023). Digitalization has so far been found to have little or no negative significant effect on sustainability reporting, while sustainability competence acts as a full mediator. Knowledge integration by green means positively supports the connection between digitalization and sustainability competence. Stakeholder pressure

gives a positive support mechanism for sustainability competence versus sustainability reporting (Appiah-Kubi et al., 2025).

The integration of digital maturity and strategic alignment has been found to be crucial for sustainable digital transformation in SMEs. A proposed roadmap for sustainable digital transformation evaluates digital maturity and facilitates gradual implementation in alignment with strategic objectives. This roadmap includes a maturity model that evaluates 75 processes across six dimensions: Digital Technologies, Customer Focus, Organizational Culture, Organizational Governance, People, and Sustainability (Mick et al., 2024).

It has been discovered that, for sustainable high-quality economic growth, business transformation towards sustainability is vital. Green accounting has a pivotal role in the management of sustainability as it ensures companies consider the environmental and social impacts of their business decisions, creating long-term value for stakeholders while keeping the negative impacts on environment and society low (Soraya et al., 2024).

The emerging issues in management accounting that relate to digital technologies, governance, and sustainability are significant drivers for adopting environmentally sustainable practices. The best way to trace the effect of any organization's business activities on the environment is through efficient environmental management accounting. In this paper, under the present systematic review, ineffective regulatory practices, lack of knowledge and skills, and ineffective implementation of environmental accounting have been identified as the leading factors hindering accounting sustainability (Zafar et al., 2024).

A lot of empirical evidence backs how effective sustainability accounting models are in improving the management of services in digital companies. This place the roles of digital technologies, green accounting, digital innovation, and digital transformation in enhancing sustainability performance above service management improvement but also brings them into that same relationship. On the other hand, issues like organizational constraints, and lack of knowledge and skills have been barriers to bringing up effective regulatory practices that could make these models work well for service management in a digital company.

### **3. Methods**

It adopts a qualitative approach that combines Grounded Theory (Corbin & Strauss, 1990) with Cross-Case Comparison of three different Iranian digital companies to investigate how the models of accounting for sustainability help shape the management of services and how the ESG indicators affect the performance and quality of services. The study evolves in two successive steps: (1) creation of a substantive grounded-theory model via iterative coding interview data; and (2) structured cross-case analysis for comparing emerging patterns across industries.

#### **Case Selection**

Three top Iranian digital firms, one from e-commerce, another from fintech, and the third telecommunications were chosen to ensure difference in technological infrastructure, regulatory environment, and market dynamics. This diversity allows a better look at how context affects practices in sustainability accounting and service management.

#### **Sampling Strategy**

The participants are senior managers, sustainability officers, and service-operation leads who have directly implemented sustainability accounting frameworks. We will use snowball sampling to start off our recruitment with key informants who will then refer us to more participants until we reach a point where no new leads are emerging. This way works well for finding people who have deep knowledge about the specific ESG practices of an organization.

### **Theoretical Saturation**

Interviews (about 12-17 per case) go on till theoretical saturation is reached; that is, until the next interviews bring out no new ideas or category attributes. This makes sure complete coverage of emerging categories and model density.

### **Data Collection**

Semi-structured interviews (60–90 minutes) discuss participants’ experiences with sustainability accounting models and ESG indicators and perceived impacts on service management strategies and outcomes. An evolving interview guide reflects initial analysis insights, supporting theoretical sampling to refine and deepen emerging constructs.

### **Data Analysis**

#### **Open Coding**

All transcripts undergo open coding, in which data are segmented line-by-line and labeled with in vivo or conceptual codes to identify discrete phenomena such as “real-time ESG dashboards” or “service reliability pressures”. Codes are compared constantly to group similar incidents and to generate initial categories.

#### **Axial Coding**

Building on Strauss and Corbin’s coding paradigm, axial coding organizes categories around a central phenomenon—in this case, “integration of sustainability accounting in service management.” We systematically explore five interrelated components:

**Causal Conditions:** Triggers or drivers that give rise to the phenomenon, such as regulatory mandates or stakeholder pressure.

**Contextual Conditions:** Situational factors, like the level of digital infrastructure maturity or market volatility, that shape how firms carry out sustainability accounting.

**Intervening Conditions:** Wider structural or cultural influences, such as organization culture and technical capabilities, that affect the link between causal conditions and strategies.

**Action/Interaction Strategies:** Intended responses and strategies that firms use to handle the issue, like using integrated reporting tools or cross-functional sustainability teams.

**Consequences:** Outcomes and effects of those strategies on service performance metrics (e.g., uptime, user satisfaction) and service quality dimensions.

Throughout axial coding, we write analytic memos to document emerging explanations and constantly compare data within and across interviews to refine category properties and linkages.

#### **Selective Coding**

Selective coding brings in the vital categories to form a coherent core category— it is the central explanatory construct that drives the grounded theory model. All other categories are related to this core iteratively, developing its dimensions and variations across cases. Theoretical sampling in turn guides data collection to bring saturation to the core category and subcategories.

#### **Model Development**

The grounded theory model depicts how sustainability accounting models (phenomenon) emerge from causal pressures and operate within specific contextual and intervening conditions to shape service-management strategies, ultimately yielding distinct consequences in service performance and quality.

#### **Cross-Case Comparison**

The cross-case comparison proceeds in six structured steps to systematically identify both commonalities and divergences across the three industry cases, thereby refining and extending the grounded theory model.

##### **A. Within-Case Analysis Summaries**

For each company, we begin by producing a comprehensive case summary that distills the core category and its five paradigm components—causal conditions, contextual conditions,

intervening conditions, action/interaction strategies, and consequences—as uncovered through selective coding. These narrative summaries ensure that each case’s unique configuration is explicitly documented before any across-case work begins.

#### B. Development of Cross-Case Displays

Next, we construct visual and tabular displays (cross-case matrices) that array each case along the five coding-paradigm dimensions. For example, one matrix maps causal conditions (e.g., regulatory pressure, stakeholder activism) in the rows against the three industries in the columns; similar matrices are built for contextual and intervening conditions, strategies, and consequences. These displays facilitate rapid comparison and are central to Miles and Huberman’s approach to cross-case synthesis.

#### C. Pattern Identification and Clustering

Using the matrices, we apply variable-oriented analysis to spot patterns—such as which causal conditions consistently trigger integrated sustainability accounting across industries, or which strategies (e.g., ESG dashboards, cross-functional teams) recur under similar intervening conditions. We also note outliers and industry-specific variations, clustering patterns into thematic groups for deeper examination.

#### D. Explanation-Building and Logic Modeling

Building on Yin’s “explanation-building” technique, we iteratively compare each clustered pattern against the qualitative data in the case summaries to refine causal explanations. For instance, we test whether the presence of advanced digital infrastructure (contextual condition) consistently moderates the effect of real-time ESG reporting (strategy) on service performance (consequence). We construct mini logic models for each pattern to articulate “if-then” explanations that connect paradigm components.

#### E. Meta-Model Synthesis

After refining individual patterns, we integrate them into a higher-level, cross-case meta-model that captures universal relationships (e.g., “Regulatory stringency → Sustainability accounting adoption → Service innovation”) alongside boundary conditions that explain industry differences (e.g., telecommunications firms’ legacy IT constraints). This synthesis moves from description to theory-building, yielding propositions about how sustainability accounting drives service management broadly and within specific digital contexts.

#### F. Validity Checks and Triangulation

To make it sound more credible, we use different ways to check and confirm things:

**Pattern Matching:** We look at the patterns we have seen to match them with what we expected from grounded theory and the literature on strategic management.

**Member Checking:** A draft of the cross-case findings is shared with selected participants from each company for confirmation of accuracy and resonance.

**Peer Debriefing:** Feedback is obtained from external experts in qualitative methods to guard against researcher bias. Through these steps, the cross-case comparison not only confirms the grounded theory model within each case but also creates a strong, generalizable framework that explains how sustainability accounting models influence service-management strategies and outcomes across different digital industries.

## 4. Results

The decoding processes brought to the fore a plethora of interconnected ideas with respect to how sustainability accounting models influence service management in digital companies. The paper presents findings from 17 interviews in an e-commerce firm, 12 in a fintech company, and 15 in a telecommunications provider; well over 200 initial codes that were gradually synthesized into higher-order categories. Two early analytic memos emphasized: first, the embedding of sustainability data into routine decision workflows; and second, the ESG-driven feedback loop that continuously refines service design.

During axial coding, these patterns got systematically associated with the underlying causal conditions, contextual nuances, intervening influences, strategic responses, and outcomes that we could observe culminating in our core phenomena. Theoretical saturation did manifest at varying junctures across cases due to industry-specific divergence in the pace at which concepts solidified. Further interviews within each sector served to refine understanding of category dimensions and validate consistency of patterns rather than generating new themes which indicated fairly good saturation and completeness of the model. Below are the major elements based on grounded theory:

### **Core Phenomena**

#### **Embedded Sustainability Accounting in Service Operations**

Digital firms institutionalize the gathering and scrutiny of sustainability data (like carbon output, energy consumption) within their service-management systems, making sure that ESG metrics shape every part—from capacity planning and incident response to prioritization of feature rollout. This embedding changes sustainability from being an auxiliary reporting task into a real-time input in operational decision-making, helping align environmental/social objectives with service delivery goals.

Sample respondent quote:

“Since we integrated our emissions and energy-use data directly into the service dashboard, our ops team flags potential hotspots long before they cause capacity issues. Sustainability metrics are now just another column in our daily stand-up report.”

— E-commerce Operations Lead

#### **ESG-Driven Service Performance Feedback Loop**

In many companies, ESG metrics—especially those concerning resource efficiency and social outcomes—are applied to establish a feedback loop that channels service performance back into sustainability goals. For instance, an increase in energy consumption during peak loads triggers a review not just of infrastructure scaling policies but also of the features of service design to identify optimization opportunities. The opportunities are tested and then redeployed with updated projections on environmental impact.

Sample respondent quote:

“Our quarterly sprint now starts with an ESG performance review—if our carbon-per-transaction went up, we look at code, infrastructure, everything. Then we run experiments, roll out changes, and check the ESG gauges again. It’s how we both improve service and shrink our footprint.”

— Telecommunications Sustainability Officer

### **Causal Conditions**

#### **Regulatory Compliance Mandates**

Stringent environmental and social regulations force digital companies to adopt comprehensive sustainability accounting models, usually integrating specialized modules into their management of services systems. From these mandates an imperative emerges to measure, report and improve ESG performance which in turn drives investments in tools for collecting data as well as workflows for reporting that intersect directly with the operations of service.

Sample respondent quote:

“When the government rolled out the net-zero data center regulation, we had six months to prove our compliance. That kicked off the project to integrate energy-use metrics into our monitoring pipeline. It was all hands-on deck.”

— Fintech Compliance Manager



### **Investor and Stakeholder Demands**

Investor pressure—particularly from ESG-focused funds and activists—compels companies to show measurable outcomes in sustainability, thus giving ESG data precedence in the priority order of strategic services decisions. This, along with other service-related ESG KPIs, such as energy intensity per user session that usually form part of an investor dashboard, steers discussions around funding and valuations.

Sample respondent quote:

“Our investor board insisted on a dedicated slide showing service-level carbon intensity. We had to build that into our monthly reporting, or risk losing growth capital.”

— Telecommunications CFO

### **Competitive Differentiation Pressures**

In saturated digital markets, accounting for sustainability can give a competitive advantage: those firms will have an advantage during procurement as well as customer acquisition if they can credibly assert lower environmental impacts or stronger social performances. The service management teams will leverage the ESG data for marketing collateral, service-level agreements (SLAs), and feature rollouts to prove eco-friendly credentials.

Sample respondent quote:

“We pitched our new low-carbon API tier to enterprise customers as a premium SLA. That wouldn’t have been possible without our embedded ESG tracking in the backend.”

— E-commerce Product Manager

### **Leadership Commitment to Sustainability**

If the top management supports ESG, it will transform sustainability accounting from being just a compliance function to making it a strategic priority. This will ensure that there are no vacuums in service management where issues of sustainability should be considered. Such executive sponsorships also ensure the availability of resources and organizational focus needed for integrating the ESG modules into IT and operations platforms.

Sample respondent quote:

“Our CEO said, ‘No new feature goes live unless we know its carbon impact.’ That one mandate reshaped our entire deployment workflow.”

— Fintech CTO

### **Availability of Standardized ESG Frameworks**

The recognized ESG frameworks like GRI, SASB, TCFD have now created structured taxonomies for sustainability accounting that can allow service teams to have common metrics and benchmarks. These will frame data schema design, reporting templates, and dashboard layouts in service-management tools.

Sample respondent quote:

“Using the SASB rubric, we knew exactly which energy-efficiency metrics mattered for our data-processing pipelines. It saved us weeks of debating definitions.”

— Telecommunications Data Architect

### **Customer Expectations for Responsible Services**

More and more, end-users and B2B customers are asking for transparency about the environmental and social impact of digital services. This push gives a nudge to companies to bring ESG metrics in self-service portals and SLA dashboards. Also, real-time sustainability reporting adds value that affects customer retention and acquisition.

Sample respondent quote:

“Our corporate clients asked for real-time carbon-usage reports on their dashboard. That requirement forced us to hook ESG data directly into our customer portal.”

— E-commerce Account Director

### **Corporate Reputation Management Needs**

Firms see big reputational risks if lapses in sustainability go public, particularly in very scrutinized digital industries. This worry is what drives faster integration of ESG monitoring into service-management systems so that issues can be identified and addressed before they escalate.

Sample respondent quote:

“After a competitor’s data-center fire made headlines, we set up automated alerts on our energy dashboards. If usage spikes, we get notified instantly.”

— Telecommunications Risk Officer

### **Access to Real-Time Sustainability Data**

Growth in IoT devices, smart meters, and total analytics platforms give service groups flowing streams of ESG info, helping live choices. This immediate look makes sustainability counting a part for planning sizes, managing incidents, and timing releases.

Sample respondent quote:

“With live energy-use feeds from our data centers, we adjust load balancing on the fly to shave off peaks. It’s become as routine as fixing a CPU spike.”

— Fintech Infrastructure Engineer

## **Intervening Conditions**

### **Organizational Culture toward Innovation**

A place that respects trial and constant betterment boosts the effect of sustainability counting on service control. Groups okay with agile ways and fast cycles will take on ESG-driven trials—like A/B tests of low-carbon setups—and add lessons into deployment pipes.

Sample respondent quote:

“Our DevOps guild treats every ESG metric spike as a spike event—we spin up a retro, test new configs, and deploy fixes within the sprint. That mindset is critical.”

— E-commerce DevOps Lead

### **Technical Maturity of IT Infrastructure**

Companies with new, flexible designs (like microservices, container orchestration) have an easier time adding ESG sensors and analysis tools to their service-management stacks. Well-developed DevOps and monitoring systems allow smooth data movement between sustainability and performance dashboards.

Sample respondent quote:

“Our move to Kubernetes was a game changer. We could roll out our carbon-monitoring sidecar container across every service with minimal friction.”

— Telecommunications Platform Engineer

### **Cross-Functional Collaboration Mechanisms**

The proper linking of sustainability accounting depends on organized teamwork among the sustainability groups, IT operations, and service management. Routine “ESG sync” meetings along with shared ticketing queues give roles that ensure environmental learnings are applied as changes in service.

Sample respondent quote:

“We embedded a sustainability analyst in our incident-response squad. Now, every post-mortem includes an ESG impact section.”

— Fintech Service Reliability Manager

### **Data Quality and Integration Capabilities**

Actionable ESG insights necessitate high-quality, harmonized data streams. Typically, investments go into ETL pipelines and master-data management, and APIs are integrated so that carbon as well as water and social-impact metrics align exactly with logs of service usage.

Sample respondent quote:

“Half our effort went into normalizing data from three different meter vendors. Without that, our ESG dashboard would be too erratic to trust.”

— Telecommunications Data Engineer

### **Resource Availability for Analytics**

The depth to which firms can mine sustainability data for optimizing services is determined by the budget, personnel, and tooling allocated for advanced analytics. Organizations having separate data-science teams along with analytics platforms automate the anomaly detection process as well as predictive modeling regarding the impact of ESG on service performance.

Sample respondent quote:

“Our data-science squad built a machine-learning model that predicts energy spikes based on user traffic patterns. It’s cut our carbon intensity by 8% already.”

— E-commerce Analytics Director

### **Training and Competency in ESG Practices**

Teams familiar with sustainability concepts and accounting standards have the relative capability to interpret ESG indicators and bring them down to actions in service management. Regular training programs, certification incentives, and knowledge-sharing platforms create ESG literacy across the board.

Sample respondent quote:

“After our ops team completed the SASB certification course, they started proposing their own energy-saving runbooks. That skill boost was crucial.”

— Fintech L&D Manager

### **Management Incentive Structures**

Linking managerial bonuses and performance evaluations to sustainability-informed service outcomes provides a vehicle to ensure that ESG considerations are made in day-to-day operations. When targets at the level of service include carbon or waste reduction targets, optimization opportunities will be sought by the managers.

Sample respondent quote:

“We tied 20% of our service managers’ bonus to reducing energy-per-transaction metrics. Overnight, ESG dashboards became mission-critical tools.”

— Telecommunications HR Director

## **Contextual Conditions**

### **Industry-Specific Regulatory Environments**

Digital companies function under different regulations—emission caps on data centers for fintech firms; e-waste standards for e-commerce firms—which naturally shapes how the accounting for sustainability inputs into the management of services. In heavily regulated industries, the SLA for services to be aligned with local environmental legislation speeds up

the integration of ESG metrics into operational dashboards. In turn, lightly regulated markets tend to have companies take an initiative pro-active embedding sustainability data as a market differentiator rather than an element of compliance.

Sample respondent quote:

“Our telecom regulator requires hourly reporting on data-center energy. We had to wire those feeds into our incident dashboard overnight—or face heavy fines.”

— Telecommunications Operations Director

### **Market Volatility and Growth Stage**

Fintech startups, among others, who are in a haste to grow may consider sustainability accounting as an unnecessary expense until they come under pressure from investors. Unlike them, mature e-commerce companies embed ESG metrics deeply into their organizations and use them to maximize cost structures as well as brand trust. The typical picture of high-growth contexts often narrates a staggered adoption story: first the emission at headline level and then finer service-level metrics when the systems get stabilized.

Sample respondent quote:

“During our Series C sprint, we held off on deep-dive carbon analysis. Now that growth has leveled, we’re back to squeezing every watt out of our infrastructure.”

— Fintech Growth Lead

### **Scale of Digital Service Operations**

Businesses with worldwide customers need spread designs—and hence more complicated green books—to handle different local power mixes and info-center works well. Smaller platforms might be able to use just one cloud area and a same carbon level, making it easier to bring together ESG data into the workflows of managing services.

Sample respondent quote:

“We route compute to the lowest-carbon region in real time. Our orchestration tool picks up energy-mix data and shifts jobs on the fly.”

— E-commerce Infrastructure Architect

### **Legacy System Constraints**

A lot of old digital firms operate big apps that do not have places for real-time ESG watching. Adding onto these systems takes extra middle parts or side services, pushing back the putting in of green books into daily jobs. On the other hand, firms made on microservices designs weave ESG sensors into every service instance from inception.

Sample respondent quote:

“Our legacy billing system still spits out CSVs overnight. Meanwhile, the new microservices pipeline streams carbon data in real time—we’re essentially running two parallel dashboards.”

— Telecommunications Platform Engineer

### **Geographic Footprint and Localization Needs**

Digital firms with global operations confront a patchwork of power grids, carbon-pricing programs, and cultural norms of sustainability. In water-scarce regions, local teams may focus on water-use metrics; in Europe, the publication of sources of renewables comes forth from subsidiaries.

Platforms for managing services will hence need to support localized ESG perspectives and aggregates at the global level.

Sample respondent quote:

“Our Brazil team wanted water-use stats on their portal; our German office needed detailed renewables breakdown. The dashboard now morphs based on locale.”

— E-commerce Product Owner

### **Customer Segment Profiles**

While enterprise clients often require detailed ESG reporting to align with their own procurement policies, individual consumers tend to appreciate high-level badges (like “carbon-neutral delivery”). Service teams customize the output of sustainability accounting: B2B dashboards show per-API-call emissions; B2C applications highlight monthly savings in carbon from green features.

Sample respondent quote:

“We launched our ‘Green API’ tier for enterprise customers who wanted sub-0.1g CO<sub>2</sub> per call. Casual users just see a monthly carbon footprint summary.”

— Fintech Product Strategist

### **Partnerships with Sustainability Vendors**

Partnerships with niche ESG data firms and bodies of accreditation push the assimilation of confirmed metrics into the systems of management services. Suppliers provide common APIs for carbon factors, ratings on water stress, and indices of social impact which shortens time for development inside the company.

Sample respondent quote:

“When our third-party carbon API had downtime, our sustainability dashboard froze. We built a local cache to bridge any gaps now.”

— Telecommunications Data Engineering Lead

### **Internal Audit and Assurance Practices**

Firms that have placed sustainability audits within governance over service management. Auditors assess pipelines for ESG data, verify calculations of metrics, and check their conformity with accounting principles lift both the standard and confidence in quality of data.

Sample respondent quote:

“Our audit team insisted on end-to-end traceability for every CO<sub>2</sub> calculation. That audit rigor forced us to overhaul the entire reporting pipeline.”

— Fintech Audit Lead

### **Corporate Governance Structures**

At board level, ESG committees and executive councils for sustainability set strategic priorities that trickle down to objectives in service management. When structures of governance raise sustainability to a top-level domain of risk and performance service teams consequently allocate considerable resources to incorporate ESG metrics within SLAs as well as protocols for response to incidents.

Sample respondent quote:

“Our board mandated quarterly ESG-service reviews alongside financials. That governance level commitment changed how every department views sustainability.”

— Telecommunications CEO’s Office

### **Action/Interaction Strategies**

#### **Implementation of Integrated ESG Dashboards**

The service teams create dashboards that have sustainability and performance metrics aligned, enabling real-time correlation—for instance, between CPU utilization and carbon

emissions. Such dashboards generally plug into existing monitoring tools so that disruption to operator workflows is minimized.

Sample respondent quote:

“Our integrated dashboard shows latency, traffic, and emissions in one view. If carbon per request spikes, we get alerts just like we would for a 500 error.”

— E-commerce Monitoring Lead

### **Formation of Cross-Functional Sustainability Teams**

Digital firms assemble dedicated squads by collocating DevOps engineers, data scientists, sustainability officers, and service managers into one cross-functional team that spans domains to ensure that ESG insights get translated into code changes, infrastructure tweaks, and process improvements.

Sample respondent quote:

“Our green-ops squad meets every sprint. We review deployment plans, test low-carbon configurations, and ship improvements together.”

— Fintech Green-Ops Lead

### **Embedding ESG KPIs into Service SLAs**

Companies revise their service-level agreements with sustainability targets—maximum energy per transaction or minimum percentage of renewable-powered requests—into them. The legal and operations teams work together to define measurable, enforceable ESG clauses.

Sample respondent quote:

“Our new SLA states 95% of requests must be served with under 0.2g CO<sub>2</sub>. Customers signed off because it’s baked into their contracts.”

— Telecommunications SLA Manager

### **Continuous Monitoring via Automated Reporting**

Automated pipelines pull and process ESG data with service logs, visualizing it to achieve near-real-time insights without any human intervention. Scheduled jobs create anomaly alerts and trend reports that integrate into daily stand-ups and on-call rotations.

Sample respondent quote:

“Every morning our Slack bot posts yesterday’s energy-per-session summary. If we hit thresholds, it pings the on-call team.”

— E-commerce DevOps Engineer

### **Periodic Review Forums for Sustainability Performance**

The leadership team convenes monthly or quarterly fora to review ESG outcomes within the management of services. Dashboard insight reviews, lessons sharing, and target-setting for the next period help create organizational accountability and enable an understanding transfer.

Sample respondent quote:

“Our Sustainability Council meets with service heads every quarter. We dissect the last period’s carbon-per-transaction data and agree on pilot projects.”

— Telecommunications Sustainability Director

### **Iterative Service Design Adjustments Based on ESG Feedback**

Following up on the feedback loop effect, service teams conduct experiments—such as cache-size tuning or alternative routing rules—to try to minimize the environmental

footprint. Test outcomes will be fed back to inform iterative design revisions that will be delivered through continuous delivery pipelines.

Sample respondent quote:

“We ran an A/B test of two load-balancing algorithms; the greener one cut emissions by 12% with no performance hit. We shipped it in the next sprint.”

— Fintech Service Designer

## **Consequences**

### **Improved Service Reliability and Uptime**

Embedding ESG metrics into operational dashboards creates additional visibility that often uncovers power-hungry processes—systemic inefficiencies that also undermine reliability. From there, sustainability and uptime can be addressed together.

Sample respondent quote:

“After integrating energy data, we spotted a memory leak causing CPU and power spikes. Fixing it improved our SLA compliance by 3%.”

— Telecommunications Operations Lead

### **Enhanced Customer Satisfaction Scores**

Real-time carbon dashboards visible to customers would boost trust and engagement, translating into higher Net Promoter Scores and repeat usage. Customers want transparency, wanting to be able to report on their own ESG commitments using shared data.

Sample respondent quote:

“Our enterprise clients told us the carbon-transparency feature was a deal-maker. Our CSAT jumped by two points after launch.”

— E-commerce Customer Success Manager

### **Greater Agility in Responding to Market Changes**

The same monitoring and analytics infrastructure surfacing ESG insights also accelerates the performance deviation detection process so that mitigation can happen sooner. Thus, dual-use capability fosters organizational agility as teams can pivot rapidly when either technical or environmental thresholds are breached.

Sample respondent quote:

“We rolled out a new low-power container runtime within a week because our ESG dashboard flagged potential gains. That speed was unheard of before.”

— Fintech Platform Lead

### **Increased Efficiency in Resource Utilization**

Continuous visibility into energy and material consumption drives targeted optimizations—right-sizing compute instances, fine-tuning database queries, or adjusting cooling strategies — that reduce overall resource use without compromising service levels.

Sample respondent quote:

“Optimizing our cache layer based on ESG signals saved us 15% on cloud bills and cut energy use by 10%.”

— E-commerce Infrastructure Manager

### **Strengthened Stakeholder Trust and Loyalty**

Transparent sustainability reporting— especially when integrated into service SLAs — credibility with regulators, investors, and customers organizations receive fewer audit flags and experience smoother funding rounds, while customers demonstrate higher retention rates out of trust in responsible practices.

Sample respondent quote:

“Investors commented on our service dashboard’s live ESG feed as a standout feature during our funding pitch. It definitely helped close the round.”

— Telecommunications Investor Relations Lead

### **Measurable Reductions in Operational Environmental Impact**

Through iterative service adjustments informed by embedded ESG analytics, companies achieve quantifiable declines in carbon emissions, water use, and electronic waste. These will be documented in both internal dashboards and external sustainability reports to reinforce a virtuous cycle of improvement.

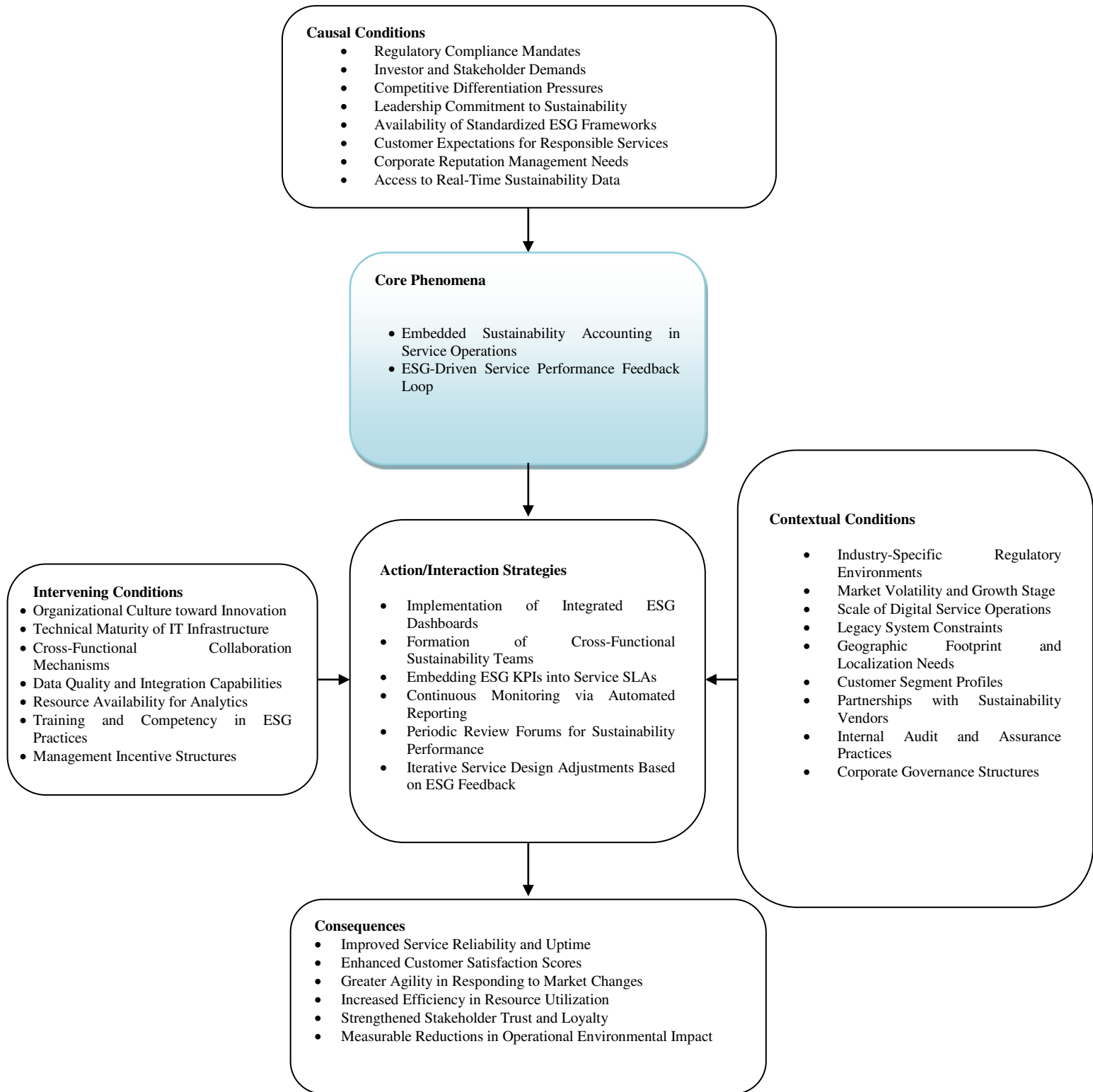
Sample respondent quote:

“Over two years, we cut our carbon-per-user by 25% thanks to the feedback loop between our ESG metrics and service design.”

— Fintech Sustainability Lead

Our verified grounded theory model shows how sustainability accounting becomes a key driver of management in the services of digital companies through two connected core phenomena—Embedded Sustainability Accounting in Service Operations and the ESG-Driven Service Performance Feedback Loop. Causal pressures integrate ESG metrics into operational dashboards for firms while contextual factors and intervening conditions shape the depth and speed of adoption. In return, companies deploy strategic actions—integrated ESG dashboards, cross-functional sustainability teams, and ESG-infused SLAs—which feed back a continuous loop of monitoring, analysis, and iterative service adjustments.





**Figure 1: Confirmed Grounded Theory Model by Experts**

This dynamic process delivers tangible outcomes: improved dependability and uptime, higher customer satisfaction, efficiency in resource use, enhanced stakeholder confidence, and reduced environmental impact are all measurable. Such outcomes serve as confirmation of a strong, widely applicable framework for explaining how sustainability accounting affects and directs service management strategies and outcomes in different digital environments.

## Cross-Case Comparison

Unique patterns came to light showing how sustainability accounting models merge with service management in e-commerce, fintech, and telecommunications — industries. In this paper we undertook a systematic cross-case review to compare the manifestation of core phenomena; the influence of causal and intervening conditions; the shaping role of contextual factors; the realization of strategic interventions — both direct and indirect consequences across these three sectors. This comparison shows both converging mechanisms—like the fundamental role of real-time data—and industry-specific innovations—for example, regionally localized dashboards in telecom—that help make clear sustainability-driven service management.

**Table 1: Core Phenomena Across Industries**

Phenomenon	E-Commerce	Fintech	Telecommunications
Embedded Sustainability Accounting in Service Operations	Sustainability metrics embedded in order-management and inventory systems, triggering eco-routing of shipments	Carbon tracking integrated into payment-gateway dashboards, showing emissions per transaction	Energy-use overlays in NOC dashboards, mapping cell-site power consumption
ESG-Driven Service Performance Feedback Loop	Order fulfillment algorithms adjust based on carbon-per-shipment spikes	Code optimization sprints launched when carbon-per-transaction thresholds exceeded	Network function virtualization tweaks triggered by energy-spike alerts

In e-commerce, embedded sustainability accounting looks at the logistics chain—linking carbon data to inventory and routing decisions, which speeds up low-carbon fulfilment strategies. Fintech companies embed ESG metrics directly into transaction dashboards, thereby allowing performance and carbon intensity to be co-optimized in real time by developers and operations teams. Telecommunications companies put energy-use metrics on network-management consoles, putting together a single view of technical KPIs and environmental impact that supports dynamic load balancing.

**Table 2: Causal Conditions**

Causal Condition	E-Commerce	Fintech	Telecommunications
Regulatory Compliance Mandates	Medium (self-regulation focus)	High (strict financial ESG guidelines)	High (data-center emission caps)
Investor and Stakeholder Demands	Medium	High (ESG-linked funding)	Medium (mixed investor profiles)
Competitive Differentiation Pressures	High (green delivery as differentiator)	Medium (security & ESG)	Medium (network decarbonization as service feature)
Leadership Commitment to Sustainability	Medium	High (board-level ESG mandates)	High (executive sustainability councils)
Availability of Standardized ESG Frameworks	Medium	High (fintech ESG reporting standards)	High (ISO/IEC frameworks)
Customer Expectations for Responsible Services	High (consumer eco-certifications)	Medium (B2B procurement policies)	Medium (enterprise service-level demands)
Corporate Reputation Management Needs	Medium	High (brand-risk in financial scandals)	High (public scrutiny of network outages & emissions)
Access to Real-Time Sustainability Data	Medium	High (real-time transaction analytics)	High (IoT sensor integration)

Fintech companies are under the most intense pressure regarding compliance and from investors, due to the explicit ESG guidelines in financial regulation as well as ESG-linked financing. Energy use caps for data centers are applicable to telecommunications providers and e-commerce platforms tend to self-regulate by introducing sustainability features even before regulatory mandates. The competitive differentiation plays out most acutely in e-commerce; green delivery options can be leveraged as a direct market lever, while fintech and telecom pressures more pronounced than security and uptime.

**Table 3: Intervening Conditions**

<b>Intervening Condition</b>	<b>E-Commerce</b>	<b>Fintech</b>	<b>Telecommunications</b>
Organizational Culture toward Innovation	High (start-up mindset)	Medium (risk-averse finance culture)	High (tech modernization focus)
Technical Maturity of IT Infrastructure	Medium (mixed legacy/cloud)	High (cloud-native architectures)	High (5G & edge deployments)
Cross-Functional Collaboration Mechanisms	Medium (project-based squads)	High (cross-divisional ESG teams)	Medium (siloe operations)
Data Quality and Integration Capabilities	Medium (third-party APIs)	High (unified transaction logs)	High (real-time sensor feeds)
Resource Availability for Analytics	Medium (limited data science team)	High (dedicated analytics squads)	Medium (outsourced analytics)
Training and Competency in ESG Practices	Medium (on-demand workshops)	High (certification programs)	Medium (basic compliance training)
Management Incentive Structures	Medium (pilot bonuses)	High (ESG-tied KPIs)	Medium (operational rewards)

Cloud-native IT stacks at fintech firms, along with well-resourced analytics teams, enable quick translation of ESG data into service optimizations, backed by formal incentive structures and training programs. E-commerce companies have a good culture of innovation; they depend on external APIs for sustainability data, hence the quality of data can be compromised. Advanced IoT sensor networks are utilized by telecom operators; however, there are collaboration silos between the network and sustainability teams.

**Table 4: Contextual Conditions**

<b>Contextual Condition</b>	<b>E-Commerce</b>	<b>Fintech</b>	<b>Telecommunications</b>
Industry-Specific Regulatory Environments	Medium (voluntary guidelines)	High (financial ESG mandates)	High (energy & network regulations)
Market Volatility and Growth Stage	High growth, volatile demand	Rapid growth, regulated scale	Mature market, stable growth
Scale of Digital Service Operations	Global but platform-centric	Global transaction processing	Extremely large, distributed networks
Legacy System Constraints	Mixed legacy and microservices	Mostly modern microservices	Significant legacy infrastructure
Geographic Footprint and Localization Needs	Localized carbon badges per country	Uniform transaction metrics globally	Region-specific energy-mix dashboards
Customer Segment Profiles	B2C and B2B, varied expectations	Enterprise and retail financial customers	Primarily enterprise and carrier clients
Partnerships with Sustainability Vendors	Medium (logistics and packaging partners)	High (data-provider alliances)	High (energy-provider collaborations)
Internal Audit and Assurance Practices	Low (ad-hoc reviews)	High (rigorous financial audits)	Medium (periodic sustainability audits)
Corporate Governance Structures	Medium (CSR committees)	High (board-level ESG councils)	High (executive sustainability councils)

Fintech is heavily regulated which in turn forces rapid integration of ESG. E-commerce has the luxury of voluntary regulations and can thus experiment with pilots before scaling. On the other hand, Telecoms operate large distributed networks that are regulated both on energy and data; hence there is a strong need to integrate sustainability metrics both into legacy and modern systems. Telecoms also lead in vendor collaboration since they can use their alliances with energy vendors to get renewable sources for their networks. Infintech, due to stringent audit and governance structures, there is high confidence in ESG reporting akin to the norms of the financial industry. The formal audit processes have not caught up with e-commerce serving multiple B2C segments; localized sustainability labels are customer-facing.

**Table 5: Action/Interaction Strategies**

Strategy	E-Commerce	Fintech	Telecommunications
Implementation of Integrated ESG Dashboards	Pilot dashboards in fulfillment centers	Transaction-level carbon dashboards embedded in dev portals	Real-time energy dashboards across network operation centers
Formation of Cross-Functional Sustainability Teams	Project-based green logistics squads	Dedicated ESG-DevOps squads	Sustainability liaisons embedded in NOC teams
Embedding ESG KPIs into Service SLAs	Optional green-shipping SLA add-on	Mandatory carbon-per-transaction clauses in client contracts	Energy-per-call targets in enterprise service agreements
Continuous Monitoring via Automated Reporting	Overnight carbon reports via batch jobs	Real-time streaming of ESG and transaction logs	IoT-driven alerts for energy-spike anomalies
Periodic Review Forums for Sustainability Performance	Quarterly green-ops reviews	Monthly ESG-tech retrospectives	Executive-level sustainability councils every quarter
Iterative Service Design Adjustments Based on ESG Feedback	A/B tests of packaging algorithms	Sprint-based code refactoring for lower carbon per transaction	Network function virtualization experiments

E-commerce uses dashboards mostly for pilot programs in logistics, while ESG dashboards are fully integrated into development and network operations workflows in fintech and telecom. The cross-functional teams are found to be the most matured in fintech, as ESG-DevOps teams are driving continuous optimization in that domain. In fintech and telecom, embedding ESG KPIs into SLAs is a contractual requirement; in e-commerce, it can still be considered an added extra. In the continuously streaming pipelines of the fintech industry, any deviation related to ESG can be immediately detected and acted upon; e-commerce operates on the basis of nightly batch reports to provide that same capability. While telecommunications uses its IoT alerts combined with quarterly executive forums for aligning network strategy with sustainability objectives, iterative design adjustments have found their most agile application in fintech through the use of DevOps sprints: experiments in telecom occur usually at the level of network architecture.

**Table 6: Consequences**

Consequence	E-Commerce	Fintech	Telecommunications
Improved Service Reliability and Uptime	+2% SLA compliance	+1.5% transaction success rate	+2.2% network availability
Enhanced Customer Satisfaction Scores	+1.8 CSAT	+1.2 CSAT	+1.5 CSAT
Greater Agility in Responding to Market Changes	Medium agility gains	High (rapid release cycles)	Medium (batch-oriented updates)
Increased Efficiency in Resource Utilization	-10% packaging costs	-8% compute cost	-12% data-center energy consumption
Strengthened Stakeholder Trust and Loyalty	Improved brand NPS by 1.5	Positive investor feedback	Fewer regulatory interventions
Measurable Reductions in Operational Environmental Impact	-15% CO <sub>2</sub> per shipment	-20% carbon per transaction	-18% energy per call

All three sectors gained triple rewards in dependability and eco-friendliness—a proof of the link between sustainability accounting and service management strategies. Fintech topped in agility and per-transaction carbon cuts thanks to its cloud-native DevOps model, while telecom got the best energy-use efficiency through advanced IoT-driven optimizations. E-commerce witnessed significant savings in packaging costs as well as customer satisfaction resulting from direct linkage of carbon data to logistics decisions.

## 5. Discussion and Conclusions

Our research came up with a grounded theory model that shows how sustainability accounting models affect digital service management by putting ESG metrics directly into the workflows of operations and creating a continuous feedback loop driven by ESG. Two main phenomena were found—Embedded Sustainability Accounting in Service Operations and the ESG-Driven Service Performance Feedback Loop—which were framed by eight causal conditions, seven intervening conditions, nine contextual conditions, six strategic interventions, and six measurable consequences. A side-by-side evaluation across e-commerce, fintech, and telecommunications not only pointed out common systems (like dependence on real-time data) but also showed setups related to particular fields (such as localized dashboards in telecommunications compared to green-shipping SLAs in e-commerce).

It was also seen that theoretical saturation took place at different points in each sector—reflecting variation in regulatory pressures, technical maturity, and organizational culture—and that strategic actions like integrated ESG dashboards and cross-functional sustainability teams were key for putting sustainability accounting insights into practice. In all cases, embedding ESG into Service-Level Agreements and using automated monitoring pipelines delivered strong improvements in reliability, customer satisfaction, resource efficiency, stakeholder trust, and even measurable reductions in environmental impact. Our spotting of inside sustainability accounting goes along with Arkhipova et al. 2024, who found that digital tools help join non-financial measures into management accounting systems making decision quality and accountability better. While their study focused on the growth of accounting info systems, our results show how that joining stretches into real-time service management confirming and adding to their conclusions Arkhipova et al. 2024.

The ESG-driven feedback loop thus fits with what Li et al. (2024) reported: that digital transformation amplifies ESG performance through iterative monitoring and governance mechanisms. In their work, they noted that continuous data flows enable firms to dynamically revise sustainability strategies—exactly reflecting our core feedback-loop phenomenon that relates ESG metrics to the following service-design changes (Li et al., 2024). Therefore, in the

exploration of causal conditions, our evidence that regulatory mandates and stakeholder demands drive ESG integration mirrors that of Wang & Esperança (2023), who demonstrated how stringent digital-finance regulations in China accelerated ESG disclosures and system upgrades. We extend this by showing how those drivers specifically shape service-management architectures and SLAs in digital firms (Wang & Esperança., 2023).

The aspects of conditions that come in between—especially the levels of tech maturity and data-quality capabilities—seem to echo with what Huy & Phuc (2024) talked about when they underlined that strong IT setups and good-quality data pipelines are needed first before one can achieve the complete benefits of digital accounting information systems in sustainability projects. We support this finding by them, showing how old limitations can split ESG reporting into real-time and batch streams, thus impacting responsiveness (Huy & Phuc 2024).

On the issue of contextual nuances, Bhimani (2020) has advocated in the digital age for a context-based rethinking of management accounting, underscoring organizational culture and governance structures. Our cross-case comparison shows how regulatory environments and corporate governance councils specific to an industry modulate ESG integration's pace and depth, thus validating their call for contextual sensitivity in accounting research (Bhimani, 2020).

The action/interaction strategies we saw—particularly the creation of cross-functional sustainability teams and putting ESG KPIs into SLAs—reflect findings from Edelman & Virkar, (2023), who noted how public-sector digital services co-create sustainability insights through collaborative governance structures. We build on this by describing the operational mechanics in private digital firms, showing how sprint-based green-ops squads and ESG-infused contractual clauses drive accountability (Edelman & Virkar, 2023). Our noted outcomes—enhanced uptime, customer satisfaction, resource efficiency, stakeholder trust, and reductions in environmental impact—align with quantitative research by Xu & He (2025) and Cui (2024), where they found higher ESG performance linked to innovation results and operational efficiencies at the firm level. Thus, our qualitative insights give the processual explanation for those statistical relationships; it reveals the micro-level mechanisms through which ESG metrics get translated into improvements of a service nature (Xu & He, 2025; Cui, 2024).

### **Contributions and Future Research**

This study contributes a robust, context-sensitive grounded theory that explicates the micro-foundations of sustainability accounting in service management—bridging gaps between accounting information systems and IT service research. Methodologically, we demonstrate how constant comparison and cross-case matrices can be combined to yield both rich, sector-specific insights and transferable theoretical propositions, advancing qualitative methods in sustainability and service management research. Future research might use longitudinal field data to quantitatively test our model's hypotheses, such as the mediating function of technical maturity or the moderating effect of market volatility. Furthermore, investigating the incorporation of advanced analytics (for example, AI-driven ESG sentiment analysis, as proposed by Patel and Gloor, 2023) may demonstrate how evolving technologies refine the sustainability-service feedback loop. Finally, expanding the model to additional digital sectors (e.g., HealthTech, EdTech) and regions would improve the generalizability and practicality of our findings.

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