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From products to platforms: strategic service in the appliance sector through the AaaS model

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Abstract

This study critically examines the strategic feasibility of repositioning a conventional appliance manufacturer, such as Flama, as an Appliance-as-a-Service (AaaS) provider, within the broader frameworks of sustainability, digital transformation, and the circular economy. Employing a qualitative case study methodology, the analysis is grounded in internal strategic documentation and structured through conceptual lenses including the Resource-Based View (RBV), VRIO analysis, Dynamic Capabilities Theory, and strategic planning tools such as the Ansoff Matrix and SWOT. Complementary instruments for Environmental, Social, and Governance (ESG) alignment are also incorporated to assess value creation through sustainability.

The findings indicate that the AaaS model—while context-sensitive—facilitates more stable revenue streams, enhances customer lifetime value, and enables the strategic deployment of Internet of Things (IoT) technologies and predictive analytics to increase operational agility. Circularity is not merely a theoretical principle but is operationalised through practices such as refurbishment cycles, reverse logistics, and lifecycle carbon tracking. Moreover, ESG-integrated key performance indicators (KPIs) strengthen governance structures by embedding accountability throughout organisational layers.

The study concludes that AaaS signifies a fundamental shift from product-centric models to regenerative, service-oriented ecosystems. Although such a transition presents structural and behavioural challenges, it offers a credible and strategically sound pathway for industrial renewal within the evolving post-linear economy.

Keywords: Appliance-as-a-Service; Circular Economy; Sustainability; Digital Transformation; Business Model Innovation

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1. INTRODUCTION

The transition from product-centric to service-oriented business models is a hallmark of contemporary economic transformation, epitomised by the rise of Everything-as-a-Service (XaaS), which shifts value creation from ownership to access, outcomes, and sustained user engagement (Bhattacharya & Bhattacharya, 2021). While initially rooted in digital sectors—e.g., SaaS, PaaS, and IaaS—XaaS models are now reshaping manufacturing and consumer goods industries, prompting a reconfiguration of how value is delivered (Leminen et al., 2022). This evolution is grounded in the 'economy of functionality', wherein utility supersedes possession as the basis of value, aligning closely with circular economy principles that seek to decouple economic growth from material consumption (Stahel, 2010).

Within this context, Appliance-as-a-Service (AaaS) emerges as a strategic model offering appliance functions—such as laundering or refrigeration—via subscription or pay-per-use, without transferring ownership (Samuelsson, 2023; Circular X, 2020; Krishna & Bailloeul, 2014). These models frequently integrate smart technologies, predictive maintenance, and reverse logistics for refurbishment (Boucher et al., 2024). Pioneering examples include Bundles in the Netherlands, Electrolux's leasing-based pilots, and BSH's BlueMovement, which pairs appliance access with ESG reporting. Decentralised models such as Fat Llama also illustrate the extension of access-based logic through peer-to-peer rentals. Collectively, these initiatives underscore the strategic and ecological viability of AaaS at the nexus of digital innovation, sustainability, and circular business design (Paic, 2022; Wolf, 2016).

This study addresses how a traditional Portuguese domestic appliance manufacturer—specifically Flama—might strategically implement an Appliance-as-a-Service (AaaS) model, and examines the implications for its value proposition, competitive positioning, and sustainability orientation. Faced with market saturation and rising digital, environmental, and institutional pressures, Flama is exploring a service-based repositioning strategy underpinned by digital transformation and circular economy principles.

Three objectives structure the research: (1) assessing the applicability of the XaaS paradigm, particularly via the Economy of Functionality, in a sector still dominated by ownership-based consumption; (2) evaluating the firm's internal resources, dynamic capabilities, and external market conditions using strategic frameworks including the Resource-Based View (RBV), VRIO analysis, TOWS matrix, and international benchmarking; and (3) developing a phased implementation roadmap with strategic objectives, key performance indicators (KPIs), and execution mechanisms.

The study contributes to servitisation and circular economy literature by applying these frameworks to a sector where product-based logic remains dominant. It offers a transferable model for manufacturers aiming to pursue digitally enabled, sustainability-driven competitive renewal through access-based value propositions. Following this introduction, Section 2 reviews literature on XaaS, servitisation, and the Economy of Functionality; Section 3 outlines the embedded case study methodology; Section 4 presents the findings and AaaS business model; and Section 5 concludes with a synthesis of contributions, limitations, and directions for future research.

2. LITERATURE REVIEW

2.1 FUNCTIONAL ECONOMY: REDEFINING VALUE THROUGH UTILITY

The functional economy represents a paradigmatic departure from ownership-based consumption models, orienting value creation around the delivery of utility rather than the transfer of physical goods. In this reconfigured logic, firms increasingly offer access to the *function* of a product—clean clothes, thermal comfort, refrigeration—rather than the product itself, thereby aligning their business strategies with objectives of environmental sustainability and resource efficiency. This transition addresses the structural inefficiencies inherent in linear economic models and responds to the pressing imperative to decouple economic performance from material throughput (Stahel, 2010).

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Walter R. Stahel's *The Performance Economy* provides a seminal articulation of this shift. He advances the concept of closed-loop industrial systems designed around durability, reparability, and reuse, shifting emphasis from product volume to functional performance. His work anticipates the logic of servitisation and the circular economy, proposing an industrial model that mitigates waste, reduces environmental impact, and fosters local employment through decentralised service infrastructures.

In an earlier contribution, *The Limits to Certainty* (Giarini & Stahel, 1989), the authors highlighted the systemic fragility of economies premised on unbounded material expansion. They called for an economic architecture grounded in adaptability, modular design, and functional value, thereby laying one of the earliest theoretical foundations for sustainability-oriented economic transitions—particularly salient in light of current climate-related risks and global supply chain disruptions.

Building on this intellectual lineage, Merlin-Brogniart (2024) offers a contemporary analysis of the functional economy's operationalisation across industrial contexts. In *Functional Economy: Economic Models, Challenges and Innovation Dynamics*, she identifies key enabling conditions—digital infrastructure, lifecycle-conscious design, and contract innovation—while underscoring institutional frictions related to risk distribution, pricing mechanisms, and consumer trust. Her analysis underlines that implementing functional economy models demands technological maturity and profound cultural and organisational shifts.

These contributions map a coherent and evolving theoretical terrain in which the functional economy emerges not merely as a sustainability-oriented alternative but as a systemic reframing of how value is conceptualised, delivered, and governed. This shift is especially germane to sectors such as domestic appliances, where Appliance-as-a-Service (AaaS) models provide tangible expressions of functional economy principles in practice.

2.2 Everything-As-A-Service (XaaS): Towards The Dematerialisation Of Value

The progression towards Everything-as-a-Service (XaaS) signifies a structural reorientation from consumption predicated on ownership to models premised on access and utility. Originating in the realm of cloud computing, the as-a-service logic has since permeated both digital and physical domains, enabling consumers and enterprises alike to subscribe to capabilities on demand. This shift has transformed the modalities through which value is created, distributed, and monetised, closely aligned with wider digitalisation, environmental imperatives, and evolving user behaviours.

Duan et al. (2015) trace the conceptual lineage of XaaS to IT-based service architectures, most notably Software-as-a-Service (SaaS) and Infrastructure-as-a-Service (IaaS), underlining how cloud technologies facilitate scalability, operational agility, and cost-efficiency. Their work establishes the technological and infrastructural preconditions that now permit the diffusion of XaaS models well beyond software, extending into manufacturing and industrial ecosystems.

Extending this analytical lens, Scalvini, Adrodegari, and Saccani (2024) examine the application of XaaS within manufacturing contexts. They argue that value is no longer defined by product ownership, but by outcomes—usage, uptime, availability, or performance—enabled by digital infrastructures such as IoT, real-time data analytics, and remote diagnostics. Effective implementation, they contend, necessitates organisational capabilities in lifecycle costing, subscription management, and the orchestration of performance-based contracts. Their findings further highlight how XaaS models foster circularity, enhance customer retention, and contribute to reductions in material intensity.

Complementing this perspective, Bhattacharya and Bhattacharya (2023) conceptualise XaaS as a strategic recalibration of business models across sectors. They emphasise a movement from transactional logics towards relational value systems, wherein predictive servicing, continuous user engagement, and integrated service experiences become central sources of competitive advantage. This is particularly salient for domestic appliance manufacturers, whose operations increasingly encompass maintenance cycles, consumption data, and end-of-life solutions embedded within the service proposition.

Taken collectively, these contributions delineate a robust theoretical foundation positioning Xaas not merely as a by-product of digital transformation but as a catalyst for it. Within the manufacturing sector, XaaS emerges

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as a bridge between service innovation and sustainability commitments. For firms like Flama, the Appliance-as-a-Service (Aaas) model exemplifies this transition, replacing discrete product transactions with continuous value flows mediated by usage, personalisation, and lifecycle stewardship.

2.3 Industrial Servitisation: Redefining Value in Manufacturing Ecosystems

The paradigm of industrial servitisation signals a profound reorientation in how manufacturing firms conceive, generate, and appropriate value. Traditionally anchored in a product-centric logic, these organisations are progressively reshaping their business models around service-led configurations, incorporating maintenance regimes, performance guarantees, digital integration, and lifecycle engagement (Johnstone, 2024). This strategic reconfiguration reflects a concerted response to intensifying global competition, shifting customer expectations, and the imperative to achieve sustainable differentiation through experiential value, rather than through static product attributes alone (Witell & Löfgren, 2013).

Baines and Lightfoot (2014) conceptualise servitisation as an intentional and strategic countermeasure to the growing commodification of manufactured goods. They argue that delivering advanced services—such as predictive maintenance, performance-based contracting, and remote monitoring—requires deep organisational transformation. Core capabilities in service design, customer relationship management (CRM), and data analytics emerge as essential enablers of this shift. Nonetheless, the authors also draw attention to significant obstacles, including entrenched cultural norms, the complexity of systems integration, and the operational challenges associated with transitioning from transactional sales to recurring revenue models.

Kindström (2010) complements this view by positioning servitisation not as a superficial enhancement, but as a fundamental rearticulation of the firm's business model. He underscores the necessity of reconceptualising value creation logics, delivery infrastructures, and revenue architectures. Among the critical enablers he identifies are modular service design, strategic alignment with customer-centric priorities, and continuous innovation in value propositions—elements particularly pertinent for firms adopting subscription-based or outcome-driven contractual frameworks.

The findings of this study suggest that, for *Flama*, servitisation forms the strategic foundation of its evolution towards an Appliance-as-a-Service (AaaS) model. Rather than offering standalone household appliances, the company now provides integrated service bundles encompassing functional usage, anticipatory maintenance, digital connectivity, and end-to-end lifecycle management. This transition fosters deeper, more enduring customer relationships, enhances revenue stability, and facilitates differentiation grounded in service excellence rather than technical specifications. Moreover, smart connectivity enables data-driven innovation, supports operational optimisation, and allows for predictive, needs-based service delivery.

By embedding service logic at the heart of both their strategic vision and operational execution, firms such as *Flama* reposition themselves competitively while also aligning with broader transformations in digitalisation, environmental sustainability, and stakeholder engagement. In this light, servitisation emerges not merely as a strategic mechanism, but as a transformative trajectory that redefines the contemporary role—and indeed the identity—of manufacturing firms within 21st-century economic ecosystems.

2.4 Circular Business Models: Reconfiguring Value For Sustainability And Resource Efficiency

Transitioning to circular business models requires fundamentally rethinking of value creation, delivery, and retention. In contrast to the linear "take–make–dispose" paradigm, circular approaches aim to preserve the value of products, components, and materials through reuse, refurbishment, remanufacturing, and recycling (Bocken & Ritala, 2021;) . This shift addresses environmental degradation and resource scarcity while driving innovation, cost efficiency, and stronger customer engagement (Bocken et al., 2019).

Geissdoerfer et al. (2017) define the circular economy (CE) as a regenerative system that decouples economic growth from finite resource use, complementing concepts such as cradle-to-cradle and industrial ecology. Effective CE implementation entails reconfiguring value propositions, product design, supply chains, and revenue models—requiring both technological capabilities and organisational adaptation.

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Bocken et al. (2014) identify circular business model archetypes such as "Closing Resource Loops" and "Extending Product Value", which prioritise material efficiency, renewable inputs, waste valorisation, and product longevity. These principles are typically enacted through reverse logistics and lifecycle-based strategies.

According to this study, Flama can operationalise circularity through its Appliance-as-a-Service (AaaS) model, offering subscription appliances that include maintenance, repair, and end-of-life refurbishment. This approach incorporates a CE-certified reconditioning line, blockchain-enabled traceability, reverse logistics partnerships, and lifecycle assessment (LCA) tools for monitoring and communicating carbon impacts By retaining ownership, *Flama* gains revenue stability and improved resource planning, reinforcing both economic and ecological resilience. The model also strengthens producer–user relations and supports the closure of material loops.

Circular models thus provide a robust response to sustainability challenges in manufacturing. For firms like *Flama*, embracing CE principles supports environmental goals and unlocks new value through efficiency, innovation, and trust. While the literature offers a solid foundation for understanding AaaS through functional economy, servitisation, and XaaS lenses, important tensions remain underexplored. In particular, the balance between digital personalisation and circular standardisation, and between environmental impact and model scalability, merit further investigation. Addressing these issues would enhance theoretical integration and strengthen frameworks for circular service innovation.

3 METHODOLOGY

This study adopts a qualitative case study approach (Eisenhardt, 1989; Patton, 2015; Yin, 2018) to examine the strategic, operational, and cultural transformation of *Flama*, a Portuguese household appliance manufacturer transitioning to an Appliance-as-a-Service (AaaS) model. Grounded in an interpretivist epistemology, the study seeks context-rich insights into how legacy firms reconfigure value propositions, internal capabilities, and customer architecture in response to servitisation and circularity.

Flama was purposefully selected due to its explicit ambition to pioneer a circular Aaas model in Portugal, its hybrid positioning as a manufacturer and service provider, and the availability of privileged strategic documentation. Unlike global firms pursuing incremental change, *Flama* offers a unique foundational business model transformation case.

The empirical corpus consists of ten internal documents—strategic plans, executive briefings, and operational roadmaps—complemented by financial data from Racius and Orbis. These were thematically coded using NVivo 14 across five macro-domains: value proposition, customer experience, digital architecture, circular logistics, and organisational readiness. Each domain was assessed for strategic coherence, operational feasibility, and transformational depth. Both co-authors conducted coding independently, with 15% double-coded and a Cohen's κ of 0.82 achieved, indicating strong inter-rater reliability. Data were anonymised per GDPR, and access was granted under a confidentiality agreement.

Cross-domain triangulation revealed key interdependencies—particularly where digital and behavioural dimensions intersect—and potential bottlenecks in implementation. A comparative interpretive lens referencing benchmark literature (e.g., Tukker et al., 2016; Bressanelli et al., 2020) supported contextual validity and design generalisability. Credibility was reinforced through coder triangulation and document cross-checking; transferability was pursued by aligning insights with established circular economy frameworks. The researchers adopted a reflexive stance to minimise bias despite insider access.

Limitations include the exclusive reliance on internal documentation, which may constrain interpretive plurality, and the absence of stakeholder perspectives, which limits understanding of cultural and behavioural dynamics. Additionally, the analysis assumes environmental stability, leaving the model's resilience under disruption untested. Future studies should incorporate stakeholder interviews and scenario-based assessments to deepen and extend these findings.

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Ethical and Controlled Use of AI-Based Tools

During the preparation of this work, AI-based tools were used in a limited and supervised manner, exclusively to provide auxiliary support. ChatGPT-4 was employed for preliminary stylistic and terminological refinement, while DeepL Translator assisted in the initial translation of selected passages. All outputs were reviewed, edited, and validated critically by the authors. Elicit, Consensus, and Scite were consulted as exploratory aids during the early stages of the literature review. At no point were conceptual, analytical, or argumentative decisions delegated to automated systems. Full scientific, ethical, and editorial responsibility for the content rests solely with the authors. This practice adheres to international guidelines on the ethical and transparent use of AI-assisted writing technologies.

4 DISCUSSION

The strategic assessment of Flama, conducted using an integrated multi-framework approach, revealed an uncommon alignment between internal capabilities and external conditions for adopting an Appliance-as-a-Service (AaaS) model. PESTEL analysis identified supportive macro-drivers, including regulatory pressure for circularity, rapid digitalisation, and growing consumer demand for flexible, service-based access.

Porter's Five Forces confirmed a highly competitive market, shaped by strong consumer bargaining power and emerging substitutes such as reconditioned appliances and platform-based solutions—highlighting the need for structural differentiation through service-led innovation.

Internally, RBV and VRIO analyses identified valuable, partially inimitable resources—namely industrial agility, brand capital, and local market proximity—whose strategic potential depends on effective organisational deployment. The Dynamic Capabilities View indicated moderate maturity: initial IoT competencies exist, but scaling algorithmic capabilities remains a challenge.

A dynamic SWOT validated the strategy's robustness, with a manageable risk profile supported by structured governance mechanisms, including Stage-Gate decision protocols, cross-functional oversight, and SLA enforcement. Together, these findings provided a strong evidential base for informed strategic formulation.

Building on the strategic diagnosis, this study outlines Flama's transformation strategy as a shift from conventional manufacturing to service-led, circular innovation through the Appliance-as-a-Service (AaaS) model. Central to this repositioning is the redefinition of its value proposition—placing user experience, predictive maintenance, and product lifecycle sustainability above traditional sales.

Guided by the Ansoff Matrix, market development and product innovation focused on subscription-based offerings tailored to defined user segments, supported by persona mapping and differentiated value propositions. Strategic clarity was sharpened using Lafley and Martin's Five Questions, which clarified purpose (delivering premium circular comfort), target customers (e.g., urban professionals and families), aspirational positioning (leader in premium home services), and required capabilities (IoT, customer experience, data analytics).

The MOST framework structured a three-to-five-year roadmap around three priorities: scaling the subscriber base, activating circular infrastructure, and embedding digital excellence. Objectives were translated into KPIs such as ARPU, churn rate, NPS, system uptime, reconditioning ratio, and ESG indicators.

Scenario-based stress testing—modelling a 20% increase in operating costs—demonstrated the model's resilience, conditional on pricing agility and retention. Overall, the strategy aligns with global ESG and digital transition imperatives, reinforcing Flama's competitive positioning through service-centric innovation and ecosystem coherence.

5. PRODUCT STRATEGY, MARKET ORIENTATION AND SUSTAINABLE POSITIONING

Flama's revised product and market strategy reflects a deliberate shift—analysed in this study—from product-centricity to a service-led, digitally enabled, and sustainability-oriented model. At its core lies a redefined customer value proposition, developed through applying the Value Proposition Canvas,

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incorporating co-creation, behavioural segmentation, and circular design to address functional, emotional, environmental, and societal needs. This study conceptualises the resulting service bundle as comprising connected appliances, predictive maintenance, rapid replacement through the Flama Concierge programme, and gamified onboarding—offered via flexible, usage-based subscriptions. Such a configuration positions Flama as a provider of adaptive utility rather than a conventional goods manufacturer.

The marketing mix was also restructured as part of this analysis: the product became an integrated service experience; pricing adopted dynamic, usage-tiered logic; and distribution expanded through an omnichannel blend of e-commerce, showrooms, and digital platforms. Data-driven promotional strategies were examined, including influencer partnerships, CRM triggers, and referral incentives, alongside enhanced service quality through staff training, journey mapping, and ESG-certified packaging.

The Blue Ocean ERRC Grid guided strategic reformulation in this study, supporting the elimination of inefficiencies, reduction of ownership friction, elevation of circularity standards, and introduction of sustainability dashboards and AI-driven recommendations.

Using the Green Business Model Canvas, this research identified how Flama embedded environmental and social value via modular eco-design, closed-loop logistics, blockchain-enabled traceability, and carbon avoidance metrics. Porter's generic strategy framework further demonstrated that a dual-focus differentiation strategy best aligns with the company's resource base and long-term trajectory. In light of these findings, this study positions Flama as a premium circular service brand distinguished by environmental credibility, urban accessibility, and digital sophistication. It offers a compelling blueprint for sustainable appliance consumption in the European market.

4.1 Implementation pathway, anticipated impact and global strategic coherence

To successfully implement the Appliance-as-a-Service (AaaS) model, Flama must adopt a coordinated, cross-functional roadmap governed by a Programme Office with clear authority and autonomous resources. This transformation should proceed through five integrated streams: the development of market intelligence capabilities, brand repositioning aligned with service-based logic, digital infrastructure enhancement, the operationalisation of circular logistics, and innovation in pricing strategy.

The company must deploy IoT telemetry, cloud-based analytics, predictive maintenance algorithms, and dynamic billing systems. Personalisation engines and churn prediction tools within a secure, GDPR-compliant zero-trust architecture must complement these.

On the circularity front, Flama must scale a CE-certified reconditioning line, implement a reverse logistics network with strict service-level agreements (e.g. 48-hour turnaround), and ensure product traceability through blockchain. Lifecycle assessments should be institutionalised to track carbon baselines and inform environmental performance management.

Customer experience design must include concierge-level service, seamless omnichannel engagement, and a brand identity rooted in proximity, quality, and trust. To achieve strong retention, targeting a Net Promoter Score above 60 and an 80% renewal rate, Flama should invest in showroom activations, influencer partnerships, and gamified loyalty systems.

Finally, the company must embed ESG metrics within strategic governance, treat digitalisation as a cultural transformation, and integrate sustainability from the design stage onward. This demands proactive rather than reactive leadership, positioning Flama not just as a follower of market trends, but as a benchmark in circular, intelligent, service-based manufacturing.

4.2 Anticipated impact and alignment with global trends

Should Flama adopt the Appliance-as-a-Service (AaaS) model, a multidimensional transformation is likely across economic, technological, environmental, and governance domains, consistent with global digitalisation, sustainability, and ESG performance imperatives.

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From an economic standpoint, shifting to a subscription-based model could stabilise revenues, enhance customer lifetime value, and enable longer-term planning. When supported by dynamic pricing and usage-based billing, the approach may also improve forecasting, inventory control, and margin efficiency, reducing waste and enhancing agility.

Technologically, embedding predictive maintenance through IoT telemetry and machine learning could lower service costs and minimise downtime, reinforcing both profitability and customer trust. These capabilities contribute to a more resilient, data-driven operational model. As evidenced by this study's analysis, the AaaS model presents Flama with a strategic opportunity to align its business logic with emerging expectations. By embedding circularity and digital intelligence at the operational core, Flama can strengthen commercial viability and reputational capital.

4.3 Sustainability And Circular Economy

From an environmental perspective, the AaaS model provides Flama with a viable platform to embed circular economy principles into the core of its operations. The findings of this study indicate that, if the proposed CE-certified reconditioning line and reverse logistics infrastructure are effectively realised, product lifespans could be significantly extended and e-waste volumes markedly reduced. This closed-loop system—underpinned by lifecycle assessment (LCA) baselines—would support continuous carbon footprint monitoring, the identification of environmental impact hotspots, and alignment with EU Green Deal targets and Sustainable Development Goals, particularly SDG 12 and SDG 13.

Furthermore, the adoption of modular and eco-design practices would enhance regulatory compliance while addressing shifting consumer expectations around sustainable consumption. Notably, the analysis suggests that, if strategically implemented, these environmental initiatives could elevate sustainability beyond regulatory obligation, positioning it as a driver of competitive differentiation and brand equity within an emerging post-linear economy.

4.4 Digital transformation and technological integration

The successful implementation of the AaaS model is contingent upon a robust and intelligent digital infrastructure. This study shows that, should Flama proceed with its proposed investments in IoT connectivity, real-time cloud analytics, and artificial intelligence, the company may unlock enhanced capabilities in personalisation, diagnostics, and customer engagement. High-availability service delivery would also be underpinned by edge computing and device management platforms, essential for maintaining service-level commitments in a subscription-based environment.

In addition, integrating blockchain technologies for product traceability and service history logging could reinforce data integrity and operational transparency, thereby supporting regulatory compliance and bolstering stakeholder trust. Taken together, these digital enablers are well-positioned to drive operational excellence and reinforce ESG performance by facilitating continuous monitoring, automated reporting, and real-time value chain alerts.

4.5 Alignment with esg frameworks

This study concludes that, if rigorously implemented, Flama's AaaS strategy could align closely with the foundational pillars of ESG-oriented corporate governance. Environmentally, reductions in material throughput and enhanced end-of-life processes can potentially improve resource efficiency and lower emissions. Socially, service features such as 24/7 concierge support, proactive product replacement, and accessible digital onboarding may foster inclusivity, elevate customer satisfaction, and empower users throughout the lifecycle.

From a governance perspective, introducing stage-gated decision protocols, financial risk reserves, and independent ESG audits would reinforce transparency, accountability, and strategic discipline. These mechanisms will likely enhance investor confidence, unlock sustainable financing opportunities, and strengthen the firm's reputation in increasingly ESG-conscious markets.

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Ultimately, while the success of this transformation depends on disciplined execution and stakeholder alignment, Flama's AaaS transition presents a credible pathway to systemic innovation. By concurrently addressing the imperatives of sustainability, digital modernisation, and responsible governance, the firm may reposition itself as a European benchmark in circular, data-driven, service-based manufacturing.

5. CONCLUSION

This study has explored the strategic feasibility and implications of Flama's transition from traditional manufacturing to an Appliance-as-a-Service (AaaS) model, through an integrated framework encompassing economic, operational, digital, and environmental dimensions. By aligning servitisation with circular economy principles and digital transformation, the AaaS model positions Flama to evolve into a resilient, customer-centric service provider.

When effectively enacted, the model offers pathways to stable revenue, accelerated innovation, and improved environmental performance—driven by IoT integration, predictive maintenance, and modular, low-impact product design. These capabilities align with EU policy goals and Sustainable Development Goals 12 and 13, while enhancing ESG outcomes through lifecycle accountability and transparent governance.

However, the transition requires disciplined execution. Financial rigour, cross-functional coordination, and cybersecurity preparedness will be essential, alongside structured governance mechanisms such as stage-gated implementation.

This research reflects a broader paradigm shift: from ownership to access, from linear production to regenerative models, and from transactional to relational value. With strategic clarity and operational discipline, Flama is well placed to emerge as a European benchmark in circular, intelligent appliance services.

The analysis draws primarily on internal strategic documentation, which may omit critical stakeholder perspectives and overlook the inherent complexities of real-world implementation. It further rests on the assumption of technological and regulatory stability, thereby leaving the model's resilience under disruptive conditions unexamined. Moreover, the lack of direct input from external stakeholders—particularly customers, employees, and service partners—constrains the exploration of experiential and behavioural dynamics. Future research should therefore incorporate stakeholder mapping and targeted qualitative inquiry, such as interviews or focus groups, to capture more holistically the drivers of adoption, user perceptions, and organisational preparedness. Finally, operational risks—including investment volatility, customer retention challenges, and the assurance of service quality over time—remain untested and merit empirical scrutiny in subsequent studies.

Future research should delve into patterns of user adoption, the ethical dimensions of data-driven service architectures, and the cross-sectoral adaptability of AaaS frameworks. Comparative and longitudinal studies will be essential to evaluate their sustained viability over time. Particular attention should be given to real-world constraints, including capital investment risks, customer attrition dynamics, and the operational resilience of Aaas models, especially in non-urban or resource-limited contexts. Moreover, future inquiry should address the scalability of such models across heterogeneous regulatory landscapes while critically examining data privacy and algorithmic accountability within Iot-enabled service ecosystems.

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