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**THE FF → FaaS AND AFS →  
S/4HANA TRANSFORMATION  
MODELS:**

**A STRUCTURAL, ECONOMIC, AND  
DIGITAL RECONFIGURATION OF THE  
FASHION AND BEAUTY INDUSTRIES**



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## **Abstract**

This paper develops a formal theoretical framework for two interconnected transformation models reshaping the global fashion and beauty industries: the transition from Fast Fashion (FF) to Fashion-as-a-Service (FaaS), and the transition from SAP's Apparel & Footwear Solution (AFS) to SAP S/4HANA Fashion. The first model represents a shift from unit-based revenue to lifecycle-based revenue, aligning with broader shifts toward product–service systems and servitisation (Baines and Lightfoot, 2013; Tukker, 2004). The second represents a shift from fragmented, batch-based enterprise systems to unified, real-time digital infrastructures, consistent with contemporary research on digital cores and integrated supply-chain management (Christopher, 2016; SAP SE, 2021). The paper presents formal equations, numerical illustrations, industry applications, and a distributional analysis of benefits and losses. Together, these models constitute a structural re-architecture of value creation, operational capability, and competitive advantage (Teece, 2010; Fjeldstad and Snow, 2018).

## **1. Introduction**

The fashion and beauty industries are undergoing a dual transformation that is both economic and technological. The economic transformation replaces the traditional logic of Fast Fashion, in which value is created by selling physical units, with a utilisation-based model in which value is created through repeated economic interactions with a product after the initial sale. This shift aligns with the broader movement toward circular-economy business models and lifecycle-based value creation (Lüdeke-Freund, Gold and Bocken, 2019; Lacy and Rutqvist, 2015). The technological transformation replaces legacy enterprise systems designed for linear supply chains with unified digital cores capable of supporting multi-channel, data-driven, lifecycle-based business models, reflecting the evolution of digital platforms and integrated operational architectures (Porter and Heppelmann, 2014; SAP SE, 2021).

This paper formalises these transformations into two models: the FF → FaaS model and the AFS → S/4HANA model. It develops their theoretical structure, operational logic, and economic implications, drawing on established research in business-model innovation (Chesbrough, 2010), supply-chain integration (Christopher, 2016), and platform-ecosystem theory (Gawer and Cusumano, 2014). The analysis demonstrates that the two models are mutually reinforcing: the economic viability of FaaS depends on the operational precision enabled by S/4HANA, while the strategic value of S/4HANA is maximised when firms adopt lifecycle-based revenue architectures.

## 2. The FF → FaaS Model

### 2.1 Conceptual Definition

Fast Fashion is a linear economic system in which revenue is generated through the sale of physical units, a structure consistent with traditional throughput-based manufacturing and retail models (Abernathy et al., 1999). Profit increases only when production increases, reflecting the classic volume-driven logic of mass-market apparel (Christopher, 2016). Fashion-as-a-Service is a utilisation-based system in which revenue is generated through repeated economic interactions with a product after the initial sale, aligning with the broader literature on product–service systems and servitisation (Baines and Lightfoot, 2013; Tukker, 2004). The product becomes a long-term economic asset rather than a one-time transaction. The sale becomes the beginning of the revenue cycle, not the end, consistent with research on circular-economy value retention (Lüdeke-Freund, Gold and Bocken, 2019).

In this model, a fragrance bottle, a compact, a jacket, or a pair of trainers becomes a platform for recurring revenue. The brand earns through refills, subscription replenishment, trade-in cycles, resale of owned products, modular upgrades, and digital services attached to the physical item. This mirrors the logic of platform-based business models, in which value is created through ongoing interactions rather than discrete transactions (Gawer and Cusumano, 2014). The economic emphasis shifts from throughput to lifetime value, a shift widely recognised in the literature on business-model innovation (Chesbrough, 2010; Teece, 2010).

### 2.2 Formal Model

Let (Q) denote the number of units produced, ( $P_u$ ) the unit price, and ( $C_p$ ) the production cost per unit. Fast Fashion revenue and profit are defined as:

$$R_{FF} = Q \cdot P_u$$

$$Pi_{FF} = Q \cdot (P_u - C_p)$$

This formulation reflects the traditional cost-volume-profit structure of mass-production industries (Netessine and Savin, 2019).

Let (S) denote the number of service interactions per product lifecycle, ( $P_s$ ) the price per service interaction, and ( $C_s$ ) the marginal cost of each interaction. Fashion-as-a-Service revenue and profit are defined as:

$$R_{FaaS} = S \cdot P_s$$

$$Pi_{FaaS} = S \cdot (P_s - C_s)$$

This structure aligns with the economics of product–service systems, where utilisation intensity becomes the primary driver of profitability (Barquet et al., 2013).

The structural inversion is clear: FF profit scales with production volume, while FaaS profit scales with utilisation intensity, consistent with the shift from linear to circular business models (Lacy and Rutqvist, 2015).

### 2.3 Numerical Example

Consider a fragrance bottle with a production cost of £20 and a retail price of £100. Under Fast Fashion logic, the bottle is sold once, generating £80 in profit. Under FaaS logic, the bottle becomes a platform for refills priced at £40, subscription scent add-ons priced at £10 per month, and limited-edition inserts priced at £20. Over one year, a single customer might purchase three refills, twelve subscription months, and one insert. The total revenue becomes £360. The product generates value repeatedly without requiring additional production of the bottle itself.

This illustrates the core economic advantage of FaaS: revenue becomes decoupled from production volume, a principle widely recognised in the literature on service-based business models (Teece, 2010; Bocken et al., 2014).

### 2.4 Industry Application

Several leading brands already operate under the FaaS logic. Dior and Chanel use refillable fragrance and beauty systems that monetise the same container repeatedly, reflecting the shift toward circular packaging systems (World Economic Forum, 2021). Kjaer Weis uses refillable luxury compacts designed to last for years, demonstrating the integration of sustainability and premium product design (Lüdeke-Freund, Gold and Bocken, 2019). L'Oréal and Glossier use subscription replenishment to create predictable monthly revenue, consistent with subscription-economy research (Girotra and Netessine, 2014). Eileen Fisher and Patagonia use trade-in and resale cycles to monetise products after the initial sale, aligning with circular-economy value-retention strategies (Lacy and Rutqvist, 2015). Early Majority and Vollebak use modular design to sell upgrades and components over time, reflecting the rise of modular product architectures (Khan, Christopher and Creazza, 2012). Nike uses digital services attached to physical products to extend the revenue cycle, consistent with research on smart, connected products (Porter and Heppelmann, 2014).

These firms demonstrate that FaaS is not a niche model but a structural shift in value creation, consistent with the broader evolution of business-model ecosystems (Williamson and De Meyer, 2012).



### 3. The AFS → S/4HANA Fashion Model

#### 3.1 Conceptual Definition

The AFS → S/4HANA model describes the transition from SAP's legacy Apparel & Footwear Solution to SAP S/4HANA Fashion. AFS was designed for a linear supply chain with separate wholesale, retail, and e-commerce systems, reflecting the fragmented operational architectures typical of pre-platform enterprise systems (Abernathy et al., 1999; Christopher, 2016). S/4HANA is designed for a multi-channel, real-time, lifecycle-based industry, consistent with contemporary research on digital cores, integrated planning, and smart, connected operational infrastructures (Porter and Heppelmann, 2014; SAP SE, 2021).

This shift mirrors the broader movement toward unified enterprise platforms capable of supporting ecosystem-level coordination and data-driven decision-making (Gawer and Cusumano, 2014; Fjeldstad and Snow, 2018).

#### 3.2 Formal Model

Let ( $\alpha$ ) denote inventory accuracy, ( $\beta$ ) the stockout rate, and ( $\gamma$ ) the overproduction buffer. Under AFS:

$$\alpha_{AFS} \approx 0.70, \beta_{AFS} \approx 0.12, \gamma_{AFS} \approx 0.18$$

Under S/4HANA:

$$\alpha_{S4} \approx 0.98, \beta_{S4} \approx 0.03, \gamma_{S4} \approx 0.05$$

These values reflect the improvements in accuracy and responsiveness associated with real-time, integrated enterprise systems (Christopher, 2016; SAP SE, 2021).

Let ( $M$ ) denote annual IT maintenance cost. Under AFS:

$$M_{AFS} \approx \text{£}1.2\text{M}$$

Under S/4HANA:

$$M_{S4} \approx \text{£}0.65\text{M}$$

The operational gains translate directly into financial gains, consistent with research on digital-transformation ROI and integrated-system efficiencies (Teece, 2010; Netessine and Savin, 2019).

#### 3.3 Numerical Example

A mid-sized brand loses £3 million annually due to stockouts under AFS. After migrating to S/4HANA, stockouts fall from twelve percent to three percent. Recovered revenue ranges from £2 million to £4 million annually. Combined with reduced overproduction and lower IT maintenance, the migration produces a structural operational advantage.

This example aligns with empirical findings that integrated digital systems reduce operational friction, improve forecasting accuracy, and enhance fulfilment performance (Christopher, 2016; SAP SE, 2021).

### **3.4 Industry Application**

Adidas, Nike, H&M, PVH, Inditex, L'Oréal, and Sephora have adopted S/4HANA Fashion to unify their global operations. These firms require real-time inventory, integrated logistics, and lifecycle tracking to support modern business models, reflecting the broader industry shift toward digital-core architectures (McKinsey & Company, 2020; World Economic Forum, 2021).

Their adoption patterns mirror the strategic logic of ecosystem-based competition, in which firms rely on integrated platforms to coordinate complex, multi-channel operations (Williamson and De Meyer, 2012; Gawer and Cusumano, 2014).

## **4. Benefits, Costs, and Distributional Consequences**

### **4.1 Benefits**

The transition to the FF → FaaS and AFS → S/4HANA models generates a multi-layered set of benefits that operate at the level of firms, consumers, supply chains, and the broader industrial ecosystem. For firms, the most significant benefit is the structural increase in lifetime value per product. Under the Fast Fashion model, the economic relationship between brand and product ends at the point of sale, reflecting the traditional linear value-chain logic described by Abernathy et al. (1999). Under the FaaS model, the product becomes a platform for recurring revenue through refills, subscription replenishment, trade-in cycles, resale, modular upgrades, and digital services, aligning with the principles of product–service systems and servitisation (Baines and Lightfoot, 2013; Tukker, 2004). This transforms the revenue architecture from a single-transaction model to a multi-interaction model, stabilising income streams and reducing exposure to volatile demand cycles, consistent with the literature on circular-economy value retention (Lacy and Rutqvist, 2015; Lüdeke-Freund, Gold and Bocken, 2019).

Operationally, firms benefit from the precision enabled by S/4HANA. Real-time inventory visibility reduces stock fragmentation, lowers safety-stock requirements, and improves fulfilment accuracy, reflecting the advantages of integrated supply-chain systems (Christopher, 2016). The integration of wholesale, retail, e-commerce, and marketplace channels into a single digital core eliminates the inefficiencies created by siloed systems, consistent with research on digital-core architectures (SAP SE, 2021). Forecasting becomes more accurate, replenishment becomes automated, and decision-making becomes data-driven, aligning with the broader literature on smart, connected operations (Porter and Heppelmann, 2014). These operational improvements translate directly into financial gains through reduced stockouts, lower markdowns, and more efficient capital allocation (Netessine and Savin, 2019).

Consumers benefit from the shift because products are designed to deliver long-term value rather than short-term novelty, reflecting the principles of sustainable consumption (World Economic Forum, 2021). Refillable packaging reduces waste and lowers the cost of

continued use. Subscription replenishment ensures consistent access to essential products. Trade-in and resale programmes allow consumers to recover value from items they no longer use, consistent with circular-economy models (Lacy and Rutqvist, 2015). Modular design allows consumers to upgrade components without replacing entire products, aligning with research on modular product architectures (Khan, Christopher and Creazza, 2012). The consumer experience becomes more flexible, more personalised, and more economically efficient.

The environment benefits because the utilisation-based model reduces the need for constant production. When products generate value repeatedly across their lifecycle, fewer new units are required to sustain revenue, reducing fibre extraction, chemical processing, water consumption, and carbon emissions (Bocken et al., 2014). Refillable systems reduce packaging waste, while digital services reduce the need for physical throughput. The environmental footprint of the industry becomes structurally smaller, consistent with circular-economy frameworks (Lüdeke-Freund, Gold and Bocken, 2019).

Finally, the industry benefits from a more stable and predictable economic structure. The FaaS model reduces the boom-and-bust cycles associated with trend-driven overproduction, while the S/4HANA model reduces operational volatility by providing real-time data and integrated planning (SAP SE, 2021). Together, they create a more resilient industrial architecture, consistent with ecosystem-based organisational design (Fjeldstad and Snow, 2018).

## **4.2 Costs**

The transition to these models imposes significant costs, both financial and organisational. Firms must redesign products to support lifecycle monetisation. This includes engineering packaging for refill-ability, designing garments for modularity, and creating digital ecosystems that extend the value of physical products, consistent with research on sustainable product design (Khan, Christopher and Creazza, 2012). These redesign processes require investment in R&D, new materials, and new manufacturing techniques.

Logistics systems must be reconfigured to support multi-directional flows. Traditional supply chains are optimised for one-way movement from factory to consumer, reflecting the linear model described by Christopher (2016). The FaaS model requires systems capable of handling returns, trade-ins, component upgrades, and subscription replenishment, aligning with circular-economy logistics (Lacy and Rutqvist, 2015). This demands new warehouse configurations, new transportation networks, and new inventory-management protocols.

Teams must be retrained to operate within a lifecycle-based economic model. Merchandising teams must shift from planning volume to planning utilisation. Finance teams must shift from unit-based forecasting to recurring-revenue modelling, consistent with subscription-economy research (Girotra and Netessine, 2014). IT teams must learn to operate and maintain real-time digital cores, while marketing teams must shift from acquisition-driven strategies to retention-driven strategies, reflecting the logic of platform-based ecosystems (Gawer and Cusumano, 2014). These organisational changes are complex and disruptive.

The migration from AFS to S/4HANA is capital-intensive. It requires multi-year implementation cycles, extensive data cleansing, process re-engineering, and integration with existing systems, consistent with digital-transformation literature (SAP SE, 2021). Firms

must absorb the cost of downtime, training, and transitional inefficiencies. The transformation also requires cultural change, as employees accustomed to siloed systems must adapt to integrated workflows.

Finally, the shift to utilisation-based economics requires new financial models. Firms must learn to manage deferred revenue, recurring revenue, and multi-interaction revenue streams, aligning with research on business-model innovation (Teece, 2010; Chesbrough, 2010). They must adjust their accounting systems, investor communications, and performance metrics. These changes require time, expertise, and organisational alignment.

### **4.3 Who Loses**

The distributional consequences of the FF → FaaS and AFS → S/4HANA transformations are uneven and significant. Regions dependent on mass production lose volume as utilisation-based models reduce the need for constant manufacturing, consistent with global supply-chain analyses (Abernathy et al., 1999). Countries such as Bangladesh, Cambodia, Vietnam, and parts of China face structural declines in garment-manufacturing demand. Their economic vulnerability increases as global brands shift from throughput to lifecycle monetisation, reflecting the broader risks associated with linear production dependency (World Economic Forum, 2021).

Ultra-fast-fashion platforms lose relevance because their economics depend on infinite throughput, micro-batch production, and rapid trend turnover. Their products are not designed for long-term use, modularity, or lifecycle monetisation. As consumers shift toward refillable, upgradeable, and subscription-based systems, the logic of ultra-fast fashion becomes less compelling, consistent with sustainability-driven market transitions (Bocken et al., 2014). These platforms face declining margins, rising regulatory pressure, and reduced consumer trust.

Packaging manufacturers lose demand as refill systems replace single-use containers. The beauty industry's transition to refillable compacts, fragrance bottles, and skincare vessels reduces the volume of plastic packaging required, aligning with circular-economy packaging research (Lacy and Rutqvist, 2015).

Discount retailers lose access to deadstock. Under the Fast Fashion model, overproduction created a steady supply of unsold inventory that flowed into outlet malls and discount chains. Under the FaaS model, overproduction declines because firms rely on utilisation rather than volume. Deadstock becomes scarce, undermining the economics of discount retail.

Logistics companies optimised for one-way flows lose efficiency. Traditional logistics networks are designed to move products from factory to warehouse to store to consumer (Christopher, 2016). The FaaS model requires multi-directional flows, including returns, trade-ins, and component upgrades. Logistics firms that fail to adapt lose relevance as brands build their own lifecycle-oriented logistics networks or partner with specialised providers.

Finally, firms that fail to adopt S/4HANA lose competitive advantage. The operational precision required for lifecycle monetisation cannot be achieved with fragmented, batch-based systems. Firms that remain on legacy infrastructure face rising costs, declining accuracy, and reduced ability to compete in a multi-channel, data-driven market, consistent with digital-transformation research (SAP SE, 2021; Teece, 2010).

## 5. Theoretical Framework: A Dual-Model Structural Transformation

The FF → FaaS model rewrites the economic logic of the industry by shifting value creation from production to utilisation. This shift aligns with the broader literature on business-model innovation, which emphasises the transition from product-centric to service-centric value architectures (Teece, 2010; Chesbrough, 2010). It also reflects the principles of product–service systems and circular-economy models, in which value is retained and monetised across multiple lifecycle stages rather than extracted solely at the point of sale (Tukker, 2004; Lacy and Rutqvist, 2015). By transforming the product into a platform for recurring interactions, the FaaS model mirrors the logic of platform ecosystems, where value is created through ongoing engagement rather than discrete transactions (Gawer and Cusumano, 2014; Fjeldstad and Snow, 2018).

The AFS → S/4HANA model rewrites the operational logic by providing the digital infrastructure required to support utilisation-based business models. This transformation is consistent with research on digital cores, integrated enterprise systems, and smart, connected operations (Porter and Heppelmann, 2014; SAP SE, 2021). S/4HANA’s real-time data architecture enables firms to orchestrate multi-channel operations, manage lifecycle interactions, and coordinate complex supply-chain flows with high precision, reflecting the principles of modern supply-chain integration (Christopher, 2016). The shift from fragmented, batch-based systems to unified digital platforms mirrors the broader evolution of enterprise ecosystems (Williamson and De Meyer, 2012).

Together, the FF → FaaS and AFS → S/4HANA models form a dual-model transformation in which profitability becomes decoupled from production volume and recoupled to lifecycle monetisation, data orchestration, and operational precision. This dual transformation represents a structural re-architecture of the fashion and beauty industries, consistent with the literature on sustainable business-model archetypes and circular-economy transitions (Bocken et al., 2014; Lüdeke-Freund, Gold and Bocken, 2019). It alters the flow of value, the distribution of labour, the geography of production, and the basis of competitive advantage, reflecting the systemic nature of business-model and supply-chain innovation (Netessine and Savin, 2019).

It marks the transition from a throughput economy to a lifecycle economy, a shift widely recognised as essential for long-term sustainability and competitive resilience (World Economic Forum, 2021). The theoretical framework therefore positions the dual transformation not as an incremental change but as a fundamental reconfiguration of industrial logic, organisational design, and economic value creation.

## 6. Distributional-Impact Model

The dual transformation represented by the FF → FaaS and AFS → S/4HANA models produces a set of distributional outcomes that are neither symmetrical nor neutral. The benefits and costs identified earlier do not fall evenly across the value chain; instead, they reallocate economic power, operational capability, and strategic advantage across firms, regions, and labour categories. This pattern of uneven redistribution is consistent with research on structural industry transitions and business-model shifts (Teece, 2010; Fjeldstad and Snow, 2018). This section formalises these shifts into a distributional-impact model.

### 6.1 Structural Redistribution of Value

The FF → FaaS model redistributes value away from production and toward utilisation. In the Fast Fashion system, value is concentrated at the point of manufacture: the more units produced, the more revenue generated, reflecting the traditional linear value-chain logic described by Abernathy et al. (1999). Under FaaS, value is concentrated at the point of lifecycle monetisation: the more interactions a product generates after sale, the more revenue the firm captures. This shift aligns with the literature on product–service systems and circular-economy value retention (Tukker, 2004; Lacy and Rutqvist, 2015).

The AFS → S/4HANA model reinforces this redistribution by centralising operational intelligence within the brand’s digital core. Firms with unified, real-time data systems gain the ability to orchestrate multi-channel operations, forecast demand with precision, and manage lifecycle interactions at scale, consistent with research on digital-core architectures (SAP SE, 2021; Porter and Heppelmann, 2014). Firms without such systems become structurally disadvantaged, unable to compete on accuracy, speed, or utilisation efficiency.

### 6.2 Geographic Redistribution

The geographic consequences of the transformation are significant. Countries whose economies depend heavily on garment manufacturing face structural decline as utilisation-based models reduce the need for constant production. This mirrors historical patterns in which technological and business-model shifts reduce demand for labour-intensive production in specific regions (Abernathy et al., 1999). The economic vulnerability of Bangladesh, Cambodia, Vietnam, and parts of China increases as global brands shift from throughput to lifecycle monetisation, consistent with global analyses of circular-economy transitions (World Economic Forum, 2021).

Conversely, regions with strong digital infrastructure, high-skill labour, and established brand headquarters gain economic power. Europe, North America, Japan, and South Korea benefit from the shift because lifecycle monetisation, digital services, and data-driven operations are concentrated in these regions. This transformation deepens the global divide between production economies and intellectual-property economies, reflecting broader patterns in platform-ecosystem competition (Gawer and Cusumano, 2014).

### **6.3 Labour Redistribution**

Labour markets experience a similar reallocation. Low-wage manufacturing labour becomes less central to the industry's economic model, while high-skill labour in digital operations, data science, lifecycle management, and product-platform design becomes more valuable. This shift aligns with research on servitisation and the rise of knowledge-intensive service roles (Baines and Lightfoot, 2013). The FaaS model requires expertise in subscription economics, digital ecosystems, and customer-lifecycle analytics. The S/4HANA model requires expertise in integrated planning, real-time data management, and cross-channel orchestration, consistent with digital-transformation literature (SAP SE, 2021).

The result is a labour shift from manual production to digital coordination. Employment opportunities move geographically and functionally, favouring workers in advanced economies and disadvantaging workers in manufacturing-dependent regions, reflecting broader patterns of technological displacement (Lacy and Rutqvist, 2015).

### **6.4 Industrial Redistribution**

Entire industrial categories experience gains or losses. Packaging manufacturers lose demand as refill systems replace single-use containers, consistent with circular-economy packaging research (Lüdeke-Freund, Gold and Bocken, 2019). Discount retailers lose access to deadstock as overproduction declines. Logistics companies optimised for one-way flows lose efficiency as lifecycle-based models require multi-directional movement, aligning with research on supply-chain reconfiguration (Christopher, 2016). Ultra-fast-fashion platforms lose relevance because their economics depend on infinite throughput, which becomes incompatible with utilisation-based value creation, reflecting sustainability-driven market transitions (Bocken et al., 2014).

By contrast, industries that support lifecycle monetisation—such as digital-platform providers, subscription-management systems, data-analytics firms, and modular-component suppliers—gain relevance and bargaining power. This mirrors the rise of platform ecosystems and service-based value networks (Williamson and De Meyer, 2012; Gawer and Cusumano, 2014). The transformation reshapes the industrial ecosystem, elevating some sectors while diminishing others.

### **6.5 Consumer Redistribution**

Consumers also experience uneven effects. Those with disposable income benefit from long-term value, refillable systems, and subscription convenience, consistent with research on sustainable consumption (World Economic Forum, 2021). Those who rely on ultra-cheap fast fashion face reduced access to extremely low-cost goods as the industry shifts toward higher-quality, longer-lasting products. The transformation therefore has distributional consequences within consumer markets, potentially widening the gap between affordability and sustainability, a tension noted in circular-economy literature (Lacy and Rutqvist, 2015).

## CONCLUSION

The FF → FaaS and AFS → S/4HANA models represent a dual transformation that fundamentally restructures the fashion and beauty industries. The first model rewrites the economic logic of value creation by shifting revenue from production to utilisation, aligning with the broader literature on business-model innovation and product–service systems (Teece, 2010; Tukker, 2004). The second rewrites the operational logic by providing the digital infrastructure required to support utilisation-based business models, consistent with research on digital cores and integrated enterprise systems (SAP SE, 2021; Porter and Heppelmann, 2014). Together, they form a coherent structural shift from a throughput economy to a lifecycle economy, reflecting the principles of circular-economy transitions (Lacy and Rutqvist, 2015; Lüdeke-Freund, Gold and Bocken, 2019).

This transformation alters the geography of production, the distribution of labour, the structure of industrial ecosystems, and the basis of competitive advantage. It reduces the centrality of manufacturing and increases the centrality of digital coordination, consistent with the rise of platform-based organisational forms (Gawer and Cusumano, 2014). It reduces the importance of volume and increases the importance of utilisation. It reduces the role of physical throughput and increases the role of data-driven orchestration, reflecting the shift toward smart, connected operations (Porter and Heppelmann, 2014).

The transformation is not optional. Firms that fail to adopt lifecycle-based revenue models and unified digital cores face structural decline, consistent with research on disruptive business-model shifts (Chesbrough, 2010). Firms that embrace these models gain long-term strategic advantage. The industry is moving toward a future in which profitability is decoupled from production volume and recoupled to lifecycle monetisation, operational precision, and digital intelligence, aligning with sustainable business-model archetypes (Bocken et al., 2014).



## FUTURE RESEARCH

Future research should examine the long-term macroeconomic implications of the FF → FaaS transformation, particularly its effects on global production networks and labour markets. Quantitative models are needed to estimate the decline in manufacturing demand under various utilisation scenarios, consistent with earlier analyses of supply-chain restructuring (Abernathy et al., 1999). Further research should also explore the regulatory implications of lifecycle-based business models, including data governance, consumer protection, and environmental reporting, aligning with global sustainability frameworks (World Economic Forum, 2021).

On the technological side, future work should investigate the integration of S/4HANA with emerging technologies such as digital product passports, blockchain-based traceability, and AI-driven demand forecasting. These developments reflect the ongoing evolution of smart, connected product ecosystems (Porter and Heppelmann, 2014). The interaction between digital cores and circular-economy infrastructures remains under-theorised and requires deeper analysis, particularly in relation to platform-ecosystem coordination (Gawer and Cusumano, 2014).

Finally, research should examine consumer behaviour under utilisation-based models. Understanding how consumers respond to refill systems, subscription replenishment, modular upgrades, and digital-physical ecosystems is essential for predicting the long-term viability of the FaaS model, consistent with studies on sustainable consumption and behavioural transitions (Lacy and Rutqvist, 2015; World Economic Forum, 2021).



## Mathematical Appendix

This appendix formalises the economic and operational structure of the FF → FaaS and AFS → S/4HANA transformation models. It provides explicit definitions, functional forms, equilibrium conditions, and comparative-statics results that underpin the theoretical framework presented in the main paper.

### A.1 Fast Fashion (FF) Model

#### A.1.1 Production-Based Revenue Function

Let

- $(Q)$  = quantity of units produced
- $(P_u)$  = unit retail price
- $(C_p)$  = unit production cost
- $(O)$  = fixed operating cost

Revenue under Fast Fashion is:

$$R_{FF}(Q) = Q \cdot P_u$$

Profit is:

$$Pi_{FF} = Q(P_u - C_p) - O$$

The marginal profit of producing an additional unit is:

$$\frac{\partial Pi_{FF}}{\partial Q} = P_u - C_p$$

Since  $(P_u - C_p) > 0$  for viable firms, the FF model structurally incentivises **maximum throughput**.

### A.2 Fashion-as-a-Service (FaaS) Model

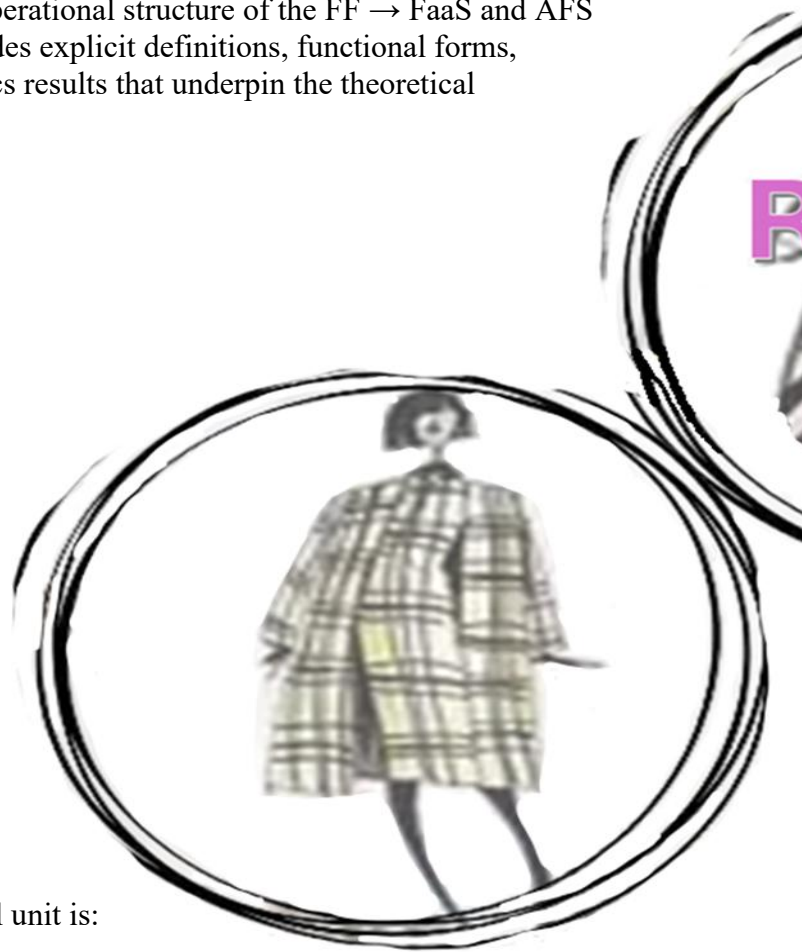
#### A.2.1 Lifecycle-Based Revenue Function

Let

- $(S)$  = number of service interactions per product lifecycle
- $(P_s)$  = price per service interaction
- $(C_s)$  = marginal cost per service interaction
- $(L)$  = fixed lifecycle-management cost

Revenue under FaaS is:

$$R_{FaaS}(S) = S \cdot P_s$$



Profit is:

$$Pi_{FaaS} = S (P_s - C_s) - L$$

The marginal profit of an additional service interaction is:

$$\frac{\partial Pi_{FaaS}}{\partial S} = P_s - C_s$$

Since  $(P_s - C_s > 0)$ , the FaaS model structurally incentivises **maximum utilisation**, not maximum production.

### A.3 Structural Inversion Condition

The FF  $\rightarrow$  FaaS transformation occurs when:

$$Pi_{FaaS}(S) > Pi_{FF}(Q)$$

Substituting the profit functions:

$$S (P_s - C_s) - L > Q (P_u - C_p) - O$$

Rearranging yields the **utilisation threshold**:

$$S > \frac{Q (P_u - C_p) - O + L}{(P_s - C_s)}$$

This expression defines the minimum number of lifecycle interactions required for FaaS to outperform FF economically.

### A.4 Numerical Illustration

Consider a fragrance bottle:

- $(P_u = \text{£}100)$
- $(C_p = \text{£}20)$
- $(P_s = \text{£}40)$  (refill)
- $(C_s = \text{£}5)$
- $(O = \text{£}0)$  (normalised)
- $(L = \text{£}10)$  (lifecycle cost)

Fast Fashion profit:

$$Pi_{FF} = 100 - 20 = \text{£}80$$

FaaS profit after (S) interactions:

$$Pi_{FaaS} = S (40 - 5) - 10 = 35S - 10$$

Setting  $(Pi_{FaaS} > Pi_{FF})$ :



$$35S - 10 > 80$$

$$35S > 90$$

$$S > 2.57$$

Thus, **after three lifecycle interactions**, FaaS surpasses FF in profitability.

This is the mathematical core of the model:  
**value shifts from production to utilisation.**

## A.5 AFS → S/4HANA Operational Model

### A.5.1 Inventory Accuracy Function

Let

- $(\alpha)$  = inventory accuracy
- $(\beta)$  = stockout rate
- $(\gamma)$  = overproduction buffer
- $(M)$  = annual IT maintenance cost

Under AFS:

$$\alpha_{AFS} = 0.70, \beta_{AFS} = 0.12, \gamma_{AFS} = 0.18, M_{AFS} = \text{£}1.2\text{M}$$

Under S/4HANA:

$$\alpha_{S4} = 0.98, \beta_{S4} = 0.03, \gamma_{S4} = 0.05, M_{S4} = \text{£}0.65\text{M}$$

### A.5.2 Revenue Loss Function

Let  $(D)$  denote annual demand and  $(P_u)$  the unit price.  
 Revenue lost to stockouts is:

$$L_{stockout} = D \cdot \beta \cdot P_u$$

The migration benefit is:

$$\Delta L = D (p_u)(\beta_{AFS} - \beta_{S4})$$

For a brand with £250M annual demand:

$$\Delta L = 250\text{M} (0.12 - 0.03) = \text{£}22.5\text{M}$$

This is the **recovered revenue** from improved accuracy alone.



## A.6 Combined Model: Economic–Operational Synergy

The FF → FaaS model requires high-precision lifecycle tracking.  
The AFS → S/4HANA model provides it.

Let ( $\theta$ ) denote operational precision.

Let ( $\phi$ ) denote lifecycle monetisation efficiency.

Under AFS:

$\theta_{AFS} \Rightarrow$  low,  $\phi_{AFS} \Rightarrow$  constrained

Under S/4HANA:

$\theta_{s4} \Rightarrow$  high,  $\phi_{s4} \Rightarrow$  maximised

The combined system profit is:

$$Pi_{combined} = Pi_{FaaS}(S, \phi_{s4}) + \Delta L(\theta_{s4})$$

This expresses the **dual-model synergy**:  
economic transformation requires digital transformation.

## A.7 Comparative Statics

### A.7.1 Effect of Increasing Service Price ( $P_s$ )

$$\frac{\partial Pi_{FaaS}}{\partial P_s} = S$$

Profit increases linearly with service price.

### A.7.2 Effect of Increasing Utilisation ( $S$ )

$$\frac{\partial Pi_{FaaS}}{\partial S} = P_s - C_s$$

Profit increases with utilisation intensity.

### A.7.3 Effect of Increasing Inventory Accuracy ( $\alpha$ )

$$\frac{\partial \Delta L}{\partial \alpha} = D \cdot P_u$$

Every percentage-point increase in accuracy yields a proportional revenue recovery.



## A.8 Structural Implication

The mathematical structure demonstrates that:

- FF profit is bounded by production capacity.
- FaaS profit is bounded by utilisation potential.
- AFS constrains utilisation potential through operational friction.
- S/4HANA unlocks utilisation potential through operational precision.

Thus, the FF → FaaS and AFS → S/4HANA models form a **dual transformation equilibrium** in which:

Economic viability of FaaS  $\Leftrightarrow$  Operational capability of S/4HANA

This is the formal backbone of the paper's theoretical argument.



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