

Research-Thesis Sustainability Challenges in the FMCG Sector: Evaluating the Role of Embellishment as a Solution for Short-Lifecycle Products and Waste Reduction

Auteur : Bonten, Manuel

Promoteur(s) : De Boeck, Jérôme

Faculté : HEC-Ecole de gestion de l'Université de Liège

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SUSTAINABILITY CHALLENGES IN THE FMCG SECTOR: EVALUATING THE ROLE OF EMBELLISHMENT AS A SOLUTION FOR SHORT- LIFECYCLE PRODUCTS AND WASTE REDUCTION

Jury:

Supervisor:

Jérôme DE BOECK

Reader(s):

Akash SINGH

Master thesis presented by
Manuel BONTEN

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List of abbreviations / Glossary

AI = Artificial Intelligence

CE = Circular Economy

CSR = Corporate Social Responsibility

EOU = End-Of-Use

EPR = Extended Producer Responsibility

ESG = Environmental, Social and Governance

FMCG = Fast-Moving Consumer Goods

GDPR = General Data Protection Regulation

GHG = Greenhouse Gases

KPI = Key Performance Indicator

LCA = Life Cycle Assessment

LEP = Limited-Edition Packaging

MOQ = Minimum Order Quantity

NGO = Non-Governmental Organisation

RTSP = Ready-to-Sell Packaging

SKU = Stock Keeping Unit

SPLC = Short Product Life Cycle

SRP = Shelf-Ready Packaging

UK = United Kingdom

1. Introduction

The Fast-Moving Consumer Goods (FMCG) industry is dominated by extremely high product turnover, heavy promotional activity, and growing sustainability pressure through the supply chain. Limited product life, constant promotional campaigns and the multiplication of packaging formats create large operational complexity and greater risk of waste, obsolescence and inefficiency for firms. As a result, packaging-related activities that are executed in proximity to the market have emerged as strategic levers for commercial responsiveness.

Within the FMCG industry, one term used to describe these late-stage packaging and reconfiguration activities is "embellishment". Embellishment typically refers to a set of operations applied to already manufactured products in order to adapt them to promotional, customer-specific, or market-driven requirements. These operations include, among others, the assembly of displays, promotional bundling, relabelling, kitting, and the creation of retailer-specific formats. Despite its use among practitioners, embellishment remains largely absent from peer-reviewed academic literature.

This absence does not indicate that the underlying practices are undocumented, but rather that they are addressed under a different academic terminology. The literature extensively analyses "contract packaging" as a late-stage, value-adding activity in FMCG supply chains, positioned between manufacturing and distribution and focused on secondary packaging, promotional execution, and operational flexibility. Empirical evidence suggests that what practitioners label as embellishment largely overlaps with what the academic literature conceptualises as contract packaging. The distinction is therefore primarily semantic and organisational rather than operational.

For this reason, contract packaging is used as a theoretical anchor to frame, interpret, and academically ground embellishment practices. By doing so, the thesis bridges the gap between industry vocabulary and academic frameworks, ensuring conceptual clarity for the reader.

Therefore, the objective of this research is to empirically define embellishment in the FMCG context, analyse its role in the management of short product life cycles, and assess its sustainability implications. Through a qualitative approach, the thesis examines whether embellishment functions as a sustainability lever or whether it shifts environmental, economic, and social trade-offs across the supply chain.

2. Literature review:

2.1. The FMCG Sector: Characteristics and Challenges

2.1.1. Defining Fast-Moving Consumer Goods (FMCG)

In the literature, the Fast-Moving Consumer Goods (FMCG) are defined on many ways, but all the sources explain that Fast-Moving Consumer Goods (FMCG) are not durable, not expensive, and have a high turnover. Plus, they flow quickly through consumption and supply chain cycles. Wu, Ono, and Wu (2025) offer a product-based definition, that contrasts FMCG with durable goods and digital products. FMCG is defined as tangible physical items "smaller in size, lower in cost, and shorter in life cycle" that consumers buy rapidly and use quickly. Thus, this short life cycle is not due to the durability of the products, but on the speed at which consumers use and substitute them. The authors highlight that FMCG creates "immediate" consumer interaction. This means that, for example, people can assess the performance of their product quickly and make an opinion on it rapidly (often after a few uses). Unlike durable items, where the commitment and the performance evaluation times are much longer, FMCG are characterised by short satisfaction cycles. In these short cycles, early expectations fall and stabilise quickly due to the frequency with which products are consumed and how rapidly the perceived value responds. This behaviour dynamic is a feature of FMCG: their consumption style generates fast feedback that sets an expectation that is quickly transferred, with performance and satisfaction coming from a response to such expectations. Thus, companies must consider this when designing, commercialising and monitoring these products (Wu et al., 2025).

Shakur et al. (2024) provide a complementary definition based more on market and retail characteristics. They also define FMCG as "inexpensive commodities sold quickly with a limited shelf life". Part of their perspective is that many FMCG products are perishable or time-sensitive, meaning they need to be sold fast to avoid being ruined or becoming obsolete. Furthermore, having a low unit cost leads to small profit margins and firms need to work with large sales, much greater purchase frequency, and big distribution networks to sustain profitability. Shakur et al. (2024) also highlight the competitive environment of FMCG markets: consumers can easily change brands because products are relatively homogeneous and, therefore, branding, promotion, packaging and availability are key. This approach characterizes FMCG beyond the speed of consumption. It also considers the marketing intensity, repeat purchase dependent structure and distribution system needed to keep market share.

While the product and market-based definitions focus on consumer-related dimensions, Nasiri, Saboori and Monfared (2025) define FMCG through the operational and supply-chain characteristics of firms in the sector. The authors identify FMCG as products moving through multi-level, connected supply chains characterised by high sensitivity to uncertainty. What makes these goods "fast-moving", in their analysis, is not only the pace of consumer consumption but also rapid movements in materials and inventory throughout the chain. Due to very small disruptions, forecast errors, or delays that can disrupt inventory availability, FMCG supply chains must be able to communicate with suppliers, manufacturers, distributors and retailers in real time. Therefore, FMCG is characterised as products with high turnover rate and demanding a narrow synchronisation of flows and continuous reduction of unknowns (Nasiri et al., 2025). From this perspective, FMCG are not independent of their operating environment: their defining traits result from the complexity, velocity and vulnerability of the supply chains around them.

The final dimension of definition emerges from the manufacturing-focused perspective of Ongbali, Afolalu, Oladipupo and Udo (2022). They conceive of FMCG as part of a material-intensive, throughput-dependent manufacturing system. Instead of targeting only the consumer or supply chain, the authors point out that the industrialisation of FMCG systems is driven in large part by substantial flows of raw materials rapidly converted to finished goods within closely tied companies connecting logistics, marketing and business management. They claim that FMCG production relies on high levels of raw-material utilisation, high production speed and continuous performance tracking. The sector is volatile, and the demand and market conditions can fluctuate regularly, so FMCG suppliers must remain highly

responsive while employing sustainable techniques in manufacturing to remain competitive. From this perspective, FMCG are characterised not only by their short-lived consumption cycles, but also by their industrial attributes, such as high resource consumption, the requirement for integrated organisational units, and the focal status of sustainable strategies including waste minimisation, efficiency, and process optimisation.

2.1.2. Supply Chain Complexity in FMCG

The FMCG sector is marked by a highly heterogeneous network of interdependent players and processes, leading to a particularly high degree of supply chain complexity. Such complexity is embedded in the structural nature of FMCG supply chains, the pace and volatility of product flows, the intensity of sustainability pressure throughout the entire supply chain and the increasing impact of consumer packaging strategies. All these factors come together to establish a system in which decisions at one stage have reverberations throughout several tiers, where collaboration, visibility and responsiveness are critical to operational and strategic performance.

2.1.2.1. Structural and Operational Complexity in Multi-Echelon FMCG Networks

At the root of this complexity is the multi-echelon nature of the FMCG supply chain. Nasiri, Saboori and Monfared (2025) conceptualize these networks as four levels of interconnection (suppliers, manufacturers, distributors and final customers) where flows of materials, information and cash are tightly linked. Since FMCG products show high turnover, fast life cycles and a large number of stock keeping units (SKU), small changes in demand or supply can have a considerable impact and alter inventory decisions, production scheduling, and replenishment patterns throughout the whole supply chain.

This network is further complicated by the FMCG sector's operational intensity, with FMCG firms being under major pressure to deliver at a high-quality level of service, to cope with unexpected demand dynamics and to react to the cycles of promotional activities. Shakur et al. (2024) also highlight the logistical complexity of distribution networks for FMCG, especially in cases where retail environments are geographically fragmented, transportation is heterogeneous and consumer preferences change rapidly. Consequently, FMCG supply chains operate as sensitive, high-velocity systems, in which synchronized coordination is essential to avoid stockouts, overstock, obsolescence and waste.

2.1.2.2. Uncertainty Propagation and Dynamic Instability

Another key aspect that complicates things is the widespread uncertainty which is everywhere up and down in the manufacturing structure of the FMCG supply chain. Nasiri et al. (2025) recognise major sources of uncertainty (including demand variability, supplier inconsistencies, planning errors and information distortions) and demonstrate that these sources are not independent. Using cognitive mapping, they reveal a network of causal interdependencies, meaning that uncertainty at one node can amplify uncertainty elsewhere. For example, poor prediction at the distributor level negatively impacts the manufacturers' production plan, which in turn affects manufacturers' capacity use and supply reliability.

These uncertainty-driven interactions drive systemic instability and make the supply chains of FMCG products vulnerable to disruptions. The authors underline that these effects go beyond simple work performance but also have financial implications, because mismatches between demand and supply immobilize working capital, increase waste, and put pressure on liquidity. Uncertainty in FMCG supply chains is thus structural and supports complexity in both daily operations and long-term strategic decisions.

2.1.2.3. Sustainability Pressures and Multi-Tier Interdependencies

The FMCG sector has also recognised sustainability as another essential determinant creating further complexity in the value chain. Prashar (2023) and Prashar & Sunder M (2025) expose the fact that FMCG firms work within a network of interacting sustainability drivers such as regulatory pressure,

competition, customer expectations, supplier requirements and internal managerial commitment. Plus, these drivers don't act independently but rather influence each other, creating multilayered decision environments.

Regulatory and legal pressure forces large-scale shifts in sourcing standards along with environmental compliance and waste-management practices that impact upstream suppliers and downstream retail operations. Meanwhile, competitive pressure is leading brands to differentiate from competitors through better and more sustainable products and packaging, remaking the way they procure, develop products and make them. Innovativeness, which is the ability to adopt new materials, redesign packaging or reconfigure logistics, comes across as a core internal driver that underlies firms' response to external pressures.

More important, the intensity and manifestation of these drivers vary across supply chain tiers. Downstream entities, such as brand owners and retailers, face strong consumer and competitive pressures, while upstream suppliers experience more regulatory and sourcing-related pressures. Prashar (2023) shows that these forces create asymmetrical but linked causal structures, and interventions that work at one tier tend to cause unintended effects at another tier. Such tier-specific approach ultimately requires complex systemic rather than isolated decision-making across the supply chain.

2.1.2.4. Circular Economy Transitions and Packaging-System Complexity

Apart from sustainability imperatives, the shift to circular economy (CE) models also adds complexities to FMCG supply chains. Clark, Trimmingham, & Storer (2019) investigate the United Kingdom (UK) chilled food packaging supply chain and suggest that circularity initiatives such as reusable packaging, high-recycled-content materials or innovative recovery systems, necessitate multiple stakeholders to work together through technical, operational and behavioural dimensions. The packaging designers, converters, food makers, brand owners, retailers and waste-management players have different sets of constraints, but circularity can only succeed if their decisions align.

In addition, the implementation of transformative technologies such as smart packaging, cutting-edge materials and reuse-tracking systems, opens a wide range of possible CE models, while also increasing the criteria decision-makers must consider. Cross-cutting determinants of CE feasibility exist across business constraints like costs, capital investment and production capabilities, and consumer behaviour in the form of their willingness to adopt new packaging formats. This interplay makes the packaging component of FMCG supply chains a concentrated node of socio-technical complexity.

2.1.2.5. Marketing-Induced Complexity: Limited-Edition Packaging (LEP)

Marketing, especially Limited-Edition Packaging (LEP), ultimately increases FMCG supply chain complexity. Indeed, LEP is characterised as temporary or scarce packaging options used to provide exclusivity, which creates significant issues of logistical and operational complexity (Dörnyei, 2020). Product-wise, the product itself remains the same, however, the packaging should be made in limited amounts, distributed in specific regions and on shelves during restricted promotional times.

Such limitations require a high degree of logistical coordination among supply chain activities. Manufacturing lines have to react quickly to artwork changes or packaging material variations. Purchasing teams need to source parts for ephemeral SKUs. Inventory planning must balance scarcity with availability. And the distribution must deliver in the exact time frame, so that LEPs are matched to marketing campaigns or seasonal events.

However, when LEPs become significantly different from the standard packaging formats, this complexity is intensified. New designs, new shapes or alternative materials necessitate additional line alterations, handling considerations, and eventual pallet layouts. As LEPs are aimed at the convergence of brand, sales, and products objectives, the cross-functional coordination of several internal teams such as marketing, category management, production and logistics, as well as external stakeholders like retailers, makes it a multi-stakeholder coordination problem. Essentially, LEP-driven complexity

highlights the ways in which consumer marketing strategies can fundamentally alter the operational dynamics of FMCG supply chains.

2.2. Short Product Life Cycles and Their Implications

2.2.1. Drivers of short cycles

2.2.1.1. Innovation as the dominant driver of SPLCs

Product life cycles are compressed by the most powerful force, which is innovation. In fast advancing industries like electronics, the evolving features, aesthetic changes, and new model launches constantly shift consumer expectations. Gan and Pujawan (2014) explains that incremental improvements are only created by new models, yet they trigger immediate consumer migration due to emotional appeal, convenience, or technological standing. This occurrence shortens the maturity stage of existing models, which quickly reach end-of-use (EOU) despite functional viability. The economic obsolescence of a product is dictated by the speed of innovation, rather than product durability.

This effect is particularly obvious in culture and creative industries. Calantone et al. (2010) underscore that each film's release is a totally new product, with no precise historical analogue, thus every film is like an invention. Novelty grabs intense but ephemeral interest to the point where demand saturates extraordinarily quickly. Tang and Dong (2021) refer to films as "single-use experience products" and the value of this product reaches its peak at the time of release and diminishes almost immediately.

Furthermore, since movies take in most of their box-office returns within days, prediction error and poor distribution decisions become irreversible. Competition at launch makes things even worse: when multiple films have to be released simultaneously, especially in the same genre, screen availability is limited, and films aren't given a chance to build momentum. This interaction between newness, uncertainty, and competitive pressure narrows the life cycle to a closed, high-stakes gap where the most valuable products either succeed or fail in a matter of seconds.

There is creativity behind the packaging strategies that are adopted to shape FMCG markets, innovation too. LEP, or Limited-Edition Packaging, depends on aesthetic novelty, including special artwork, premium textures, or thematic motifs, according to Dörnyei (2020). These designs deliberately target a limited horizon: once the novelty wears off or the promotional event is over, the product's pertinence disappears, which adds weight to short cycles.

2.2.1.2. Promotions as intentional compressing forces

These promotions strategies are deliberately short, with product life cycles being compressed purposefully. According to Dörnyei (2020), LEPs are often connected to promotional campaigns that convey insufficiency and temporal boundaries explicitly. This adds to the urgency: if consumers don't act within the promotional window, the chance is gone. Such promotions induce an abrupt but temporary surge of demand, speeding up the rise and fall of relevance.

Promotions are very prominent around release which helps increase early week attendance in the film industry. Calantone et al. (2010) emphasize marketing and distribution intensity at launch since that is when most revenue is generated. Also, Tang and Dong (2021) demonstrate that demand is determined by pre-release evidence (trailers, reviews, social media signals) that all converge at the point of release, narrowing the life cycle to a brief time window. Products such as Tamagotchi experience also undergo promotional compression: Higuchi and Troutt (2004) establish that media hype facilitates adoption, accelerating it rather than spreading it gradually, therefore shortening the total life cycle.

2.2.1.3. Seasonality and time-bound consumption

Seasonality limits product life cycles further. In FMCG packaging, many LEPs are associated with holidays (Christmas, Valentine's Day, national events), sport events, or cultural occasions (Dörnyei, 2020). The product variant has relevance during this very specific window if it is aligned on a single

point in time; once that connection is passed, it is misaligned for the consumer and it loses its symbolic meaning.

In film marketplaces, seasonality affects release timing: studios distribute films around high-attendance seasons like summer and year-end holidays (Calantone et al., 2010). This action not only reduces the cycle duration by concentrating demand, but it also escalates competition during these windows and shortens the lifetime of individual films. Seasonality also interacts with product deterioration dynamics in other categories.

Tiwari et al. (2024) point out that while demand is seasonal, certain commodities slowly decline and some goods deteriorate continuously throughout the cycle, and this means that holding stocks, even beyond peak times, is hazardous or even economically unviable. This in turn squeezes the life cycle down more and more into a narrow time-space where your value falls quickly following a seasonal high point. The studies collectively demonstrate that SPLCs are a result of fast-paced development, hyper-intensified promotional cycles, and time-limited or seasonal relevance that reduce the selling horizon significantly.

2.2.2. Patterns of waste and unsold stock

2.2.2.1. Early stockouts followed by late overstocks

The early shortage and late excess inventory sequenced is one of the most pronounced patterns observed in SPLCs. Higuchi and Troutt (2004) demonstrates that early in a trend, such as Tamagotchi, demand usually spikes significantly beyond expectations, leading to instantaneous stockouts in retailers and large sales losses as well. According to Tomlin (2009), firms must commit production and inventory levels before demand can be predicted, this pattern is replicated in SPLCs: as the selling period commences, it is often not a time for rebalancing, meaning the first stockouts cannot be adjusted by late production.

This rigidity affects the behaviour of upstream partners as well. When early sales signals are visible to manufacturers and suppliers, they react with postponed production increases. But through long lead times, not to mention the impossibility of quickly responding in the selling time frame, this output comes to the market only after demand has reached a peak. Tomlin (2009) observes that small disruptions, such as supplier delays or forecast errors, lead to large mismatches between supply and the market demand and cause products to fall through a thin selling window. As a result, late-loading inventory faces collapsing demand, an example of what has become the “boom-bust” phenomenon in commodities history, where early stockouts are followed by overstocks at factories and distributors for products who are unsellable or must be cleared at steep markdowns.

2.2.2.2. Markdowns, disposal, and the financial cost of obsolescence

Then, when demand crunches at the end of the selling period, inventory stored in the chain quickly depreciates. As Tomlin (2009) describes this loss as structural to the SPLC, because decisions need to be locked in prior to uncertainty settling down, firms are naturally exposed to obsolescence. Instead of a second selling season for any remaining inventory at the end of the cycle, you leave it stranded which, when you think about it, offers no recovery through delayed promotional opportunities or cycles to replenish sales. The result is very large financial losses as firms must release stock via massive markdowns and throw away unsellable units.

This behaviour extends to Limited Edition Packaging (LEPs), the selling window being linked to a particular event, holiday or promotion. When the event is over, remaining LEPs become more irrelevant and less sellable. Unsold LEPs have to be discounted or destroyed completely, either for the product and/or packaging since the outdated designs cannot be used to bring products into the regular lines of products (Dörnyei, 2020). In both SPLCs and LEPs, poor adjustment of inventory decisions midway through the cycle results in timing mistakes (whether caused by demand volatility, supply delays, or inaccurate forecasts) having direct financial implications with markdowns, waste, etc.

2.2.2.3. Opportunity waste and lost demand

Making stock for films is not the same as producing inventory, but a different type of waste: opportunity lost. Calantone et al. (2010) explain competitive overcrowding reduces screen allocation and since films make the bulk of their income in the early weeks, loss of screenings cannot be recovered subsequently. As Tang and Dong (2021) indicate, bad pre-market predictions lead to screen under-allocation or less marketing intensity and eventually loss of irrecoverable revenue. This is exacerbated by the structural constraints applied to short product life cycles in the creative industries.

Tang and Dong (2021) highlight the fact that films command their box office income in just a few days, and any misallocation at launch like too few screens, weak marketing, as well as the addition of rivals can immediately punishes the film's performance. Because demand vanishes so quickly, there is no significant chance at error correction, and no capture of failed demand later in the cycle. Thus, each film has just a "one-shot" selling window.

2.2.2.4. Deterioration-related unsold stock

With perishable goods, stock that has been left unsold is degraded by physical deterioration over time, causing it to lose its economic value. Tiwari et al. (2024) stresses deterioration as a structural causal factor of a short life cycle of a product: when the selling horizon is naturally limited, it is not only the demand patterns that bring in new product life, but also its biological or chemical breakdown. Overproduction early in life is the more expensive option, with surplus units going bad before reaching the end consumer and becoming waste. On the other hand, when firms postpone production or rework activities to remain away from collapse, they run the risk of experiencing shortages as demand levels reach their growth or maturity periods.

2.2.2.5. Inventory misalignment across supply chain echelons

There are recurrent challenges found in literature in the space of misalignment of inventory into the various tiers of the supply chain. The literature reveals that although retailers may suffer from stockouts, the upstream actors including manufacturers and suppliers still maintain significant inventory levels, resulting in a gap between demanded and stock (Higuchi & Troutt, 2004). Distributors, on the other hand, pile up unsold units out of their outlets because retailers won't buy them, which is yet another misallocation that leads to loss of product flow and market reactivity (Gan & Pujawan, 2014).

2.3. Sustainability challenges in FMCG Supply Chains

2.3.1. Environmental Pressures and Waste Generation

Environmental pressure and waste of FMCG supply chains is the consequence of multiple structural, material, commercial, and behavioural parameters. Packaging, plastic in particular, stands out as the primary driver of environmental pollution. Ma, Park and Moultrie (2020) demonstrate that almost 40 percent of global polymer production goes towards packaging that is intended for an extremely short lifespan but remains in ecosystems for decades or centuries. Here, the environmental pressure is twofold: extraction of fossil-based raw materials that go into producing plastics, and long-term buildup of this packaging as pollution, particularly in oceans. The results show that plastic waste is not just isolated from household waste but leaks into waterways from all stages of the FMCG supply chain because of improper recovery and variable waste-management facilities across countries. These structural weaknesses indicate that even when brands are designing packaging to be recyclable in theory, most packaging ends up incinerated, landfilled or poorly managed, becoming marine debris and adding to carbon emissions. It exposes FMCG companies to growing environmental monitoring, as well as to reputational risk as the public becomes more aware.

The extent of waste generation was quantified by Dantas et al. (2023), who find that packaging accounts for an estimated 30% of global municipal solid waste, with one-third of that waste generated by FMCG packaging in multiple places. The article details the weight of plastic dependency: 500 billion

plastic bags are used every year, every minute we buy one million plastic bottles, and 13 million tons of plastic enter oceans each year. It takes as long as a century for such materials to decompose and continuously release microplastics. This injects a public-health aspect to pressure on the environment, underscoring the urgency of switching to new packaging options, especially in situations from today. These pressures are compounded by the rise of e-commerce and the addition of secondary packaging such as bubble wrap or protective plastics.

These environmental pressures are driven by regulatory pressures as well. The literature demonstrates that governments around the world are relying on additional bans, restrictions, taxes, and extended producer responsibility (EPR) programs to force companies to redesign packaging and reduce their waste. Jain and Hudnurkar (2022) argue that sustainability regulations concerning food safety, contamination controls and types of polymers are becoming stricter, which forces FMCG companies to explore the use of biodegradable, active or intelligent packaging. But despite their potential, this kind of innovation is expensive, and most companies are reluctant to make it unless regulations establish a "level playing field," as Ma et al. (2020) said. This complexity further is aggravated by the fragmented regulations across countries: global FMCG manufacturers operate within a patchwork of local recycling regulations, plastic bags, and labelling requirements, generating operational uncertainty, as well as inconsistent incentives to reduce waste at scale.

The generation of waste is also very much shaped by consumer-driven pressures. Jain and Hudnurkar (2022) highlight the importance of heightened environmental awareness, in particular with Generation Z consumers, who increasingly take aim at brands that rely heavily on single-use plastics. Nevertheless, the authors also point to a profound paradox, suggesting that strong consumers voice a preference for sustainability, while their actual purchasing behaviour still favours convenience, price, and familiarity. This inconsistency reduces market acceptance of sustainable options, because biodegradable and/or reusable packaging is often more expensive or necessitates consumer involvement (e.g., returning containers). Ma et al. (2020), for example, find that consumers are also a primary force for plastic reduction, as activists and public pressure pushes down plastic use even as they are also one of the biggest barriers to the adoption of novel packaging formats that feel less convenient (or more money effective) for them for reasons that matter. This ambivalence serves to maintain the status quo, thus prolonging material transitions in FMCG supply chains.

Another less apparent yet significant source of waste is the advertising and marketing-induced packaging behaviour. Dörnyei (2020) shows that the phenomenon of limited-edition packaging (LEP) is now being adopted more commonly as a scarcity technique used to enhance brand identity, seasonal involvement, and short-term sales in the supply chain. These LEPs propose new temporary and original packaging designs, usually consisting of structural alterations, special inks, sleeves, or materials that provide novelty, only to be ephemerally designed. It has been shown in smaller volume designs which complicate recycling because higher diversity is produced in such designs as they create more variety in the waste stream. These are also factors that have been shown to increase packaging turnover, with new editions quickly replacing one another when the product remains unchanged. This indicates waste is not only produced by functional requirements (protection, transport and hygiene) but also by marketing logics of FMCG businesses characterised by competition (where packaging as the only way to convey messages rather than a sustainable part of products).

Kuzmina et al. (2019) are arguing that the very architecture of FMCG value chains is not compatible with sustainability as they are built for continuous growth and rapid product turnover. Their scenario planning work illustrates how that waste pressure today is due to fundamentally linear systems. "Rinse and Reuse" scenarios demonstrate the waste of single-use containers; "Cycling of Pure Materials" scenarios tell us the ways that complicated packaging arrangements prevent material from being recovered; and "Circular Retailer" scenarios illustrate how supermarkets foster excess stock, markdowns and product expiry; a lot of upstream waste that fails to find its proper place in the sustainability debates.

The articles come to suggest that the environmental pressures encountered in FMCG supply chains are multi-dimensional. They comprise environmental damages (plastic pollution, biodiversity decline, GHG emissions), socio-political pressures (public relations campaigns, NGO activism and media focus), regulatory enforcement, public health effects, and the commercial implications of brand reputation. Still, waste generation continues as these influences intersect with cost pressures, mixed consumer behaviour, established marketing logics, and poorly coordinated supply-chain infrastructures. As a result, FMCG businesses are typically responding in incremental ways: increasing recycled content, redesigning labels, rather than to radically redefine the linear system that causes waste to begin with.

2.3.2. The Challenges of Corporate Sustainability Strategies (ESG, CSR, Green Design)

Corporate sustainability strategies have grown into multi-layer complex frameworks in the FMCG industry that challenge companies to meet expectations of CSR (Corporate Social Responsibility), Environmental, Social and Governance (ESG) criteria and green-design objectives in the face of financial tensions and organisational barriers.

Perhaps, the most obvious challenge can be found in the ambiguity of sustainability frameworks themselves. The circular economy narrative, as Schögl, Stumpf and Baumgartner (2020) illustrate, is now commonly used by companies to reference sustainability principles and concepts, but is conceptually vague, containing blurred boundaries and only a partial blending with the wider sustainability and sustainable-development discourse. CE concepts often favour measurable environmental indicators while discarding social dimensions, and firms' sustainability agendas often neglect broader and more transformative practices including reduction, reuse or redesign. This conceptual ambiguity gives companies no way of realising exactly what stakeholders is looking for when referring to "green" or "circular" performance and increases the danger of exaggerating claims about sustainability accomplishments and underdelivering on social and governance challenges.

This tension becomes particularly pronounced in examining how corporate sustainability has progressed within multinational FMCG companies. The studies of Derqui (2020) show a transition to a more strategic, embedded form of sustainability rooted in brand purpose, product innovation, new business models and value creation. Though, this strategic change is far from automatic or smooth. Companies need to undergo dramatic deep organisational change as well: from empowering bottom-up leadership, making longer-term partnerships, redesigning governance, becoming more accountable, and recasting their strategic directions focused on sustainable development. Yet this shift also creates new challenges for companies, particularly where sustainability is being marketed as a revenue stream. This reframing of the issue could promote not only creativity and competition but also encouraging selective sustainability: concentrating on profitable projects and disregarding broader social or environmental priorities which do not have return short term.

Even more obstacles to linking environmental goals to social objectives emerge when we consider supply chain dynamics that dominate most FMCG business. Esfahbodi, Zhang and Watson (2016) point out that in emerging-economy supply chains, where firms operate under tight cost pressure and constrained internal capacity, environmental sustainability and cost performance often conflict rather than reinforce each other. Sustainability initiatives like green product design, pollution prevention or supplier development usually result in short-term cost increases and need technical expertise, coordination, and long-term investment that many firms fail to have. Institutional pressures from regulators, customers or multinational buyers drive suppliers toward sustainability, but internal readiness to meet these expectations is typically low. This results in compliance-oriented approaches rather than strategic ones that are not compatible with the holistic view that is promoted by ESG frameworks. Fragmented supply chains further slowdown the penetration of sustainability since weak coordination, capability asymmetries and lack of information sharing are barriers to spreading environmental and social practices across the many layers. So, commitments to sustainability are still introduced unevenly as they are implemented in isolated, individual internal initiatives versus chain-wide change.

In addition to the supply chain and organisational issues, firms have to tackle changing stakeholder expectations. Studies by Soni et al. (2024) and Das (2022) show that CSR is complex as it is being evaluated by consumers, communities and regulators through increasingly demanding expectations. Plus, consumer perspectives on CSR are fragmented, and sometimes contradictory. Despite many consumers being interested in ethical behaviour and value sensitivity, the reality becomes that they are also more concerned about price. In other words, some people worry that CSR raises product prices whilst providing no proportional benefit, while other people question the transparency of sustainability claims or the true impact of CSR activities. Such diverse perceptions introduce reputational and legitimacy risks to firms: sustainability strategies should not only be strong and meaningful, but must be well communicated, evidence-based and economically credible to consumers.

However, the challenge of alignment resurfaces clearly in the studies of Prashar (2023) and Prashar & Sunder (2025) which identify sustainability drivers in the case of FMCG supply chains, showing that external pressures and internal capabilities rarely move together in the same direction. Regulatory, competitive and social pressures drive more and more firms toward sustainability commitments, but internal drivers such as leadership vision, company culture, necessity to meet sustainability goals, availability of resources and technology readiness often don't go as fast. The complexity of FMCG supply chains exacerbates the integration challenge. With a high product turnover, diverse geographical markets, short life cycles and complex logistics networks, sustainability needs to be harmonised with suppliers, transport partners, retailers and within-organisation operations. But most companies are stuck in silos, with limited cross-functional governance structures, failing to embed ESG considerations in innovation, procurement, operations and marketing. The result is partial ESG adoption, with companies meeting the standards of external regulation but not making sufficient internal structural changes.

Green design is cited in the literature as both an opportunity and a source of tension. Within FMCG, to use eco-friendly materials, redesign packaging, increase recyclability or decrease environmental footprints may be one of the most visible examples of sustainability. Though, green design is very expensive as it requires costly investments, upgrades from suppliers, process redesign and alignment with marketing and logistics functions. Firms have to reconcile environmental ambitions with affordability, performance, consumer expectations and brand image. However, initiatives such as eco-design and packaging reduction, where there is conflict with procurement price targets or market-driven promotional strategies, can become deprioritized. This tension illustrates the larger challenge of ESG integration: sustainability won't move forward if environmental, social and governance objectives remain subordinated to short-term cost logics or if organisational incentives are disconnected from long-term goals.

2.4. The Role of Packaging and Design in Sustainability

2.4.1. Packaging Material Reduction & Sustainable Packaging Innovations

Packaging-material reduction and sustainable packaging innovations are some such top-priority strategies in the FMCG sector in terms of sustainability, but require trade-offs in environmental impact, functional adequacy, consumer expectations and technological viability. Deborah and Sugihartanto's (2024) life cycle assessment (LCA) highlight the necessity of evaluating material reduction within a comprehensive life-cycle structure. Their findings show that material mass reduction alone does not equate to sustainability enhancement: a lighter material may need more energy for processing, produce more production losses, or worse, cannot bear distribution stresses, leading to product spoilage which is an environmental impact far more significant than packaging itself. They also point out the disproportionate impact of electricity, boiler emissions and water use in their LCA which indicates sustainable innovation must complement material reduction with operating efficiency. As an example, switching to renewable energy sources or optimising steam generation systems could result in benefits that exceed those of substituting one packaging material for another.

By contrast, Steenis et al. (2017) reveal clear evidence that the lightest packaging options, such as dry carton sachets or mono-material flexible pouches, ranking highest in LCA sustainability, are often misattributed to be of lower quality, less protective or less environmentally friendly to end-consumers. The reason consumers favour heavier formats such as glass or bioplastics is that weight, rigidity and naturalness tend to be linked to sustainability in their minds. This imbalance leads to a communication challenge: material-efficient product innovations may go into commercial failure unless design cues like graphics, texture, and sustainable labels, are adapted to promote their green merits. Their work also reveals that structural innovations result in cascading perceptual effects: changing materials affect not only perceptions on sustainability but also conclusions drawn about taste, convenience, safety and price, which must be closely monitored.

Ma, Park and Moultrie (2020) show, from a technical and organisational point of view, functional limits of material reduction. Their interviews suggest that lightweighting is a widespread practice (e.g., lowering plastic bottle weight from 36 g to less than 20 g), but that such implementations need to respect quality standards, including wall integrity, stackability, thermal resistance and leakage protection. They also demonstrate that a lot of "sustainable" substitutes (bio-based plastics, coated paper, plant-fibre composites) do not deliver hygiene, protection and mechanical resistance requirements, particularly for chilled food, healthcare and carbonated drinks. That is a clear indication that long-term sustainable innovation, in fact, involves concurrent technologies (e.g. better wall coatings, more advanced mechanical strengthening methods or hybrid materials that perform the job well without necessarily needing plastic) that allow to maintain performance while reducing plastic dependency. The authors also emphasize cost considerations: material reduction is consistent with short-term business motivations as it reduces material costs, while the adoption of new materials tends to add to costs and capital demands, causing an internal organisational resistance. With a "we will if you will" effect, that tension is further reinforced, as companies will hold off radical innovations until competitors, or regulations, change the competitive baseline.

Dörnyei (2020) further enriches material reduction with insights on how design-driven innovations, such as limited-edition packaging (LEP), can either support or counteract material efficiency. LEPs built solely on graphic additions empower brands to offer new editions of their products without introducing additional layers, sleeves or other elements, and ensure that additional materials are not wasted. Though, LEPs with novelty components like interactive bow labels, textured sleeves, or multi-layer decorations, add more material complexity and unit material weight while reducing recyclability. As a result, brands that rely excessively on LEPs unintentionally increase packing throughput, causing material use to accelerate, regardless of whether individual package remains unchanged in structural terms. This emphasizes the need to align sustainability goals with marketing-led design strategies.

In contrast, Dantas et al. (2023) explicitly connect reducing materials with "green packaging" approaches that substitute conventional plastics with biodegradable, compostable and/or recyclable alternatives. They highlight replacing plastic-based sensory elements such as gloss elements, tactile features or sound signals, with simple, mono-material solutions that use fewer resources. They also emphasize that green packaging must save material mass, lower the amount of greenhouse gas emitted while being produced, and be made of materials and processes that can reduce long term ecological damage. Their investigation indicates that multisensory packaging, such as packaging with plastics and decor, adds to the environmental load and should be avoided or redesigned.

Jain and Hudnurkar (2022) expand sustainability innovation to new packaging technologies such as biodegradable film, edible packaging, the active packaging (oxygen absorption, antimicrobial layer) and intelligent packaging (freshness indicators, tracking technology). These new developments help in sustainability in that they do not only reduce or eliminate conventional plastics, but they also cut down on food waste, which is a significant challenge for the environment. They develop that packaging innovations have to strike a balance between material efficiency, functional performance and price as the high costs continue to be a barrier to mass-market consumer acceptance. Innovations that feel

intuitive and visually eco-friendly are well received by consumers, however, if the price is too high, sustainable options will be turned down entirely.

In conclusion, Clark, Trimingham and Storer (2019) situate material reduction and innovation in the context of the circular economy, pointing out that material efficient designs need to be integrated with recycling frameworks, reuse models and digital technologies. They demonstrate how supply-chain stakeholders view mono-material packaging, better sortability, reusable formats, and technology-enabled circular systems (e.g., better tracking, better washing technologies, automated sorting) as possible pathways to achieve more circular solutions. Circular innovations happen only when consumers appropriately throw out packaging, or give packaging back, when business moves can incorporate more circular processes and when infrastructure supports material recovery at scale.

2.4.2. Promotional Packaging and Consumer-Perceived Sustainability

The evidence from the FMCG literature strongly illustrates that promotional packaging is structurally and systematically more material intensive as compared to standard formats resulting in significant conflicts between commercial goals and genuine sustainability. Numerous studies indicate that promotional displays, ranging from special editions to oversized packs, packaged bundles or combo packs, lead to the addition of plastics, cardboard, coatings, decorative inks and multilayer laminates. Consequently, this leads directly to an increase in resource and energy demands, volume of transportation, and end-of-life burdens (Deborah & Sugihartanto, 2024; Das, 2022; Dantas et al., 2023).

Such materials commonly take the form of complex multi-material structures, reinforced cardboard, sleeves, or special shapes that diminish recycling potential and cause material pollution in sorting and recycling streams, going against both circular-economy principles and plastic-reduction strategies (Clark et al., 2019; Ma et al., 2020). Even ephemeral improvements in consumer experience cause a considerable increase in the environmental impact of packaging and create disproportionate impacts compared to its short-lived marketing function (Wu et al., 2025). This dynamic is part of a larger structural divergence identified within FMCG research: promotional packaging is most often animated by aesthetic logics like novelty, visual identity, shelf impact, and premium signalling while sustainability-focused packaging emphasises functional performance, material efficiency and system-level circularity.

LCA evidence further supports the concept of promotional formats as often using complex inks, varnishes, and multi-material constructions that deteriorate environmental indicators without increasing protection or logistic efficacy, while mono-material or simpler designs, though more sustainable, are often internally rejected on grounds that they are too simplistic and not premium enough (Deborah & Sugihartanto, 2024).

Steenis et al. (2017) emphasize this further, showing how heavy, material-rich formats can be misleading by acting like they are "eco-friendly" because consumers rely on cues on the surface (glass, textured paper, green colours and natural look) rather than lightweight and low-impact options (like dry cartons or simplified sachets) that often come across as cheap or as low quality. This gap between perception and reality represents a long-standing attitude-behaviour gap. Indeed, consumers push in clear and honest ways for greener packaging but heavily opt for packaging that presents a more premium, convenient or familiar proposition, even when those options are more difficult to recycle or consume more material (Ma, Park & Moultrie, 2020).

Consequently, the end result is a paradox in which we make aesthetic enhancements built with customer satisfaction and brand differentiation goals in mind, but for the limited time the result is achieved in the form of an ephemeral benefit for the customer, it locks companies into environmentally costly packaging systems with permanent problems such as waste (Wu et al., 2025). Also, industry research indicates that internal dynamics are reinforcing these patterns: marketing departments are focused on sensory, emotional and brand storytelling through visual and physical imagery, while sustainability teams are working to reduce use, standardise and recycle packaging as far as possible. In practice, the marketing perspective tends to influence the retail environment more, in which retailers

(as gatekeepers) prefer packaging designs with proven sales performance to packaging that is better for the environment with little visual appeal (Fornari, Grandi & Fornari, 2009).

These pressures are amplified by consumer misconceptions: brown paper is usually considered sustainable, whilst multi-material glossy packs are considered valuable and protective, even when these assumptions compromise recyclability and, importantly, the closed-loop packaging principle (Clark, Trimmingham & Storer, 2019). CSR-related research adds another layer of nuance: consumers use visually appealing packaging as part of communication of corporate responsibility, but the core characteristics which are in line with true CSR (durability, eco-innovation and low-material use) are rather more aligned with practical, minimalist packaging (Das, 2022).

Simultaneously, literature on circular economy suggests that packaging is more than a means of communication, it is an operational medium, as its design can impact whether consumers are able to take an active role in return schemes, recycling systems or reuse loops. Clear instructions, accessible disposal indications and logistics-compatible structures can improve perceived sustainability and true environmental performance to a large extent (Mishra, Hopkinson & Tidridge, 2018).

Collectively, the body of knowledge paints a coherent picture: promotional packaging, as driven by aesthetics, commercial and perceptual considerations, steadily raises material intensity and system complexity, and in so delivering only superficially and short-term benefits that may compromise the functional, environmental and circular features that are needed for a sustainable packaging shift.

2.5. Contract Packaging in FMCG

2.5.1. Defining Contract Packaging Role and its Core Operations

The term "contract packaging" is employed to define the outsourcing of the packaging related tasks to very specific third-party organisations that provide technical knowledge, operational and regulatory capabilities in a way difficult to maintain within the organisation (Forcinio, 2019, 2023). These vendors provide various packaging operations such as filling, pouching, blistering, labelling, cartooning and kitting. These processes are based on pharmaceutical examples; however, they closely mirror FMCG processes including bottle filling, sachet production, making multipacks and developing promotional kits.

The articles pointed out that the modern contract packagers are no longer operational executors, but rather they act more like turnkey partners across the complete packaging life cycle. They take care of design and engineering of packaging, sourcing of materials, pilot testing, scale-up, stability checks, regulatory documentation, warehousing even distribution. This evolution leads contract packagers to become inter-actors in commercialization and have impact behind both upstream and downstream market implementation.

Moreover, the articles highlight their specialization to a great degree. Providers invest in category-specific equipment and capabilities like aerosol lines, cold-chain handling or sensitive-product management that allow them to master technologies that can't be affordable by some brands. They also act as partners on regulatory knowledge, preserving their knowledge of new compliance obligations, quality guidelines and traceability systems. In FMCG, this expertise translates in food regulations, cosmetics rules, environmental packaging standards and retailer-driven traceability expectations.

2.5.2. Contract Packaging as a driver of Flexibility, Responsiveness and Promotional Execution

The two articles addressed below come to a solid conclusion that outsourcing packaging improves organisations' agility, scalability and speed-to-market. Forcinio (2019) points out that contract packagers are typically faster and quicker in responding to deviations in artwork, packaging changes or products being launched than internal facilities, thanks to their adaptable equipment, specialist manpower and experience managing a large variety of products. Forcinio (2023) also argues that speed-to-market has emerged as a central strategic rationale for outsourcing, especially in case of

brands that are required to orchestrate multi-market launches or quickly adhere to evolving regulatory requirements. This responsiveness is particularly important in FMCG, where product variants, seasonal drops, and retailer-specific formats are very common.

The scalability is another major benefit of contract packaging. External suppliers are purchasing flexible, fast, and short scale lines as well as multi-site networks to enable brand owners to run on a big commercial scale and to make short promotional or testing trials without having to spend more capital and effort (Forcinio, 2019, 2023). This flexibility of capacity enables FMCG firms to respond quickly to periods of high demand, market evaluations or special promotional campaigns while efficiently managing costs.

The articles also note that contract packaging influences market execution by facilitating the development of niche, smaller size, or tailored packing designs. In this sense, contract packaging becomes, therefore, a major driver of commercial responsiveness and marketing experimentation at once, as the contract packaging thus operates as both support for commercial responsiveness and marketing experimentation.

2.5.3. Operational constraints and Trades-offs in Contract Packaging

Although outsourcing of packaging bears many advantages, there are several constraints and trade-offs involved in its outsourcing, and such considerations are key to understanding its strategic implications in FMCG. The concern focuses on reliance on investments and capacity from suppliers. Due in part to external suppliers funding and maintaining packaging equipment, brand owners enjoy reduced capital intensity, while also becoming reliant to the provider's investment decisions, technology roadmap and line capacity availability. This dependency can limit responsiveness, especially during high-demand periods, promotional seasons, or urgent launches where the supplier may prioritise other clients (Forcinio, 2019, 2023).

The second trade-off has to do with coordination complexity. While contract packaging is technically, operationally, design & regulatory-related, outsourcing requires a great deal of information sharing, alignment of processes, combination of quality and traceability systems, and continuous contact. These coordination needs could create some delays or bureaucracy that would not present at all with internal production.

Both articles also highlight the risk of strategic lock-in. While contract packagers provide ever more integrated services across development, packaging and distribution, the partners in their business have become tightly integrated with the brand's supply chain. This integration increases efficiency but increases switching costs: new providers would require technical transfer, process re-validation, and often new regulatory submissions.

Finally, multiple-site networks by which the leading providers operate can add to governance complexities. It is essential that the quality, data integrity and operational alignment are supported by effective oversight mechanisms across different locations, which adds to the management burden. Similarly, sustainability aspirations might have been limited by the material sources or partners of the supplier, reducing the brand's direct influence on environmentally responsible packaging development.

The literature shows that contract packaging is not simply an outsourcing decision for operational reasons but rather constitutes strategic supply-chain design decision that reconfigures capabilities, dependencies and risk exposure of the firms. While it provides firms with a tremendous flexibility, speed and innovation in the field of FMCG packaging and promotional execution, this also brings dependency and complexity of various forms that must be managed closely and with long-term strategic focus with external partners.

2.6. Circular Economy Approaches in FMCG

2.6.1. Closing the Loop: From Waste to Value

Closing the loop in FMCG is about turning what is usually seen as waste into materials or products that last or create value. Throughout the studies evaluated, this transformation is found to vary according to the timing of recovery and the nature of recovery, the available infrastructures and the behaviours of both consumers and companies.

Zeeuw Van Der Laan and Aurisicchio (2019) emphasize that FMCGs go “obsolete” not so much because they degenerate bodily and physically, but because of the exhaustion of their consumable part. Packaging or components still have value if consumers channel them through the right revalorisation channels. They demonstrate that circularity relies on consumer behaviours (keeping, bringing, consigning or abandoning) encouraged by product-service systems, infrastructure and mechanisms. In their approach, circular economy in FMCG is a socio-technical framework in which design, logistics and consumer behaviour must have close coordination to prevent resource leakage. In all cases, circularity requires systems that enable convenient and clearly guided behaviours.

Waste becomes value, as Gan and Pujawan (2014) note, once firms establish structured reverse logistics systems that can track, secure and prioritize returns based on whether they remain functional. In this view, circularity relies on the possibility of re-circularising high quality returns to remanufacturing loops while steering end-of-life returns (very low in residual value) towards suitable recycling options. Crucially, despite their empirical emphasis on mobile phones, the reasoning goes well beyond electronics: FMCG categories with fast turnover similarly generate short-cycle commercial or service returns (e.g., faulty batches, unsold stock, early product recalls) that could retain a lot of residual value if captured soon enough.

In the cases of Mishra et al (2018), loop closure is done when product design, business models as well as reverse logistics are matched to make sure that materials remain in high-value cycles such as reuse, refurbishment, or high-quality recycling, rather than letting them decay. Recovery of value requires to focus on material quality, return timing, consumer acceptance, as well as supply chain coordination.

Schöggel, Stumpf, and Baumgartner (2020) find that most CE research continues to focus on recycling and end-of-life processes, with more value-added loops such as reuse, remanufacturing, and redesign not being sufficiently explored. Their results highlight a significant FMCG gap: the consumer and social aspects of circularity have been a missing part, despite the fact that consumer behaviour is central to packaging return, reuse, and refill systems. This highlights that a proportion of current FMCG circular initiatives are limited to low-value loops.

Calantone et al. (2010) highlight the rapid pace at which the value decays within SPLC. In FMCG, that means that recovery must occur fast and systematically, otherwise potential values will be lost to obsolescence or decay. Their analyses confirm the need for quick and tightly managed reverse logistics that can catch the value before it vanishes.

Ongbali et al. (2022) show that circularity needs to start upstream from the manufacturing and production phase. At this stage, sustainable approaches are crucial to eliminate waste, increase material efficiency and stabilize production processes. By working on scrap limitation and on resource efficiency, the manufacturers, beyond reducing material losses, ensure that the quality and consistency of their products increase. This upstream efficiency is key as it drives how well downstream recovery loops are able to be feasible. Indeed, products that exit the manufacturing stage with fewer imperfections and higher material integrity are far more ready to be reused, remanufactured or recycled. Thus, production efficiency is seen as a necessary precursor for effective and genuinely circular systems from this perspective, and as a way to create successful loop-closing practices across the supply chain.

Finally, Kuzmina et al. (2019) demonstrate that FMCG circularity can follow incremental pathways focused on recyclability, intermediate pathways around reuse and refill systems, or transformative

pathways around new retail infrastructures, governance structures and consumption cultures. The degree of circularity achieved depends on the reconfiguration depth of product design, business models, logistics and consumer practices, as their scenarios illustrate.

From these viewpoints, closing the loop within the FMCG context is best characterised as a coordinated process in which resource value is captured early, retained through design and production, and followed up by consumer participation and reverse logistics. Waste becomes value when systems work together to extract the remaining technical, material and economic value before it decomposes, and when products and packaging systems are designed to circulate as opposed to being thrown away.

2.6.2. Remanufacturing and Product Life Extension

Recent studies refute the common supposition that SPLC goods are not suitable for remanufacturing. Gan and Pujawan (2014) find that fast-moving electronics such as cell phones still have high technological value long before consumers throw them away and are therefore suitable for remanufacturing if firms are carefully acting soon enough. They argue that the feasibility of remanufacturing is contingent, in large part, on types of returns and the timing of such returns: early commercial and warranty returns, which have short residence times with little wear, may be brought to "as-new" condition, while end-of-life returns happen too late with too little residual value. Their remanufacturability model combines innovation rate with return quality, acquisition cost and timing, and it emphasizes that for short-life products, the core issue is speed. Remanufacturers have to quickly inspect, sort, and rework devices so refurbished units can be re-introduced into the market before technological obsolescence diminishes their usefulness. Their research also emphasizes how important it is for warranties/quality assurance since those are the main determinants of buyer acceptance for refurbished high-tech products.

Zhou and Gupta (2020) take this view a step further to illustrate how depreciation of value determines the feasibility with which high-technology products could be refurbished. Short innovation cycles lead to steep early depreciation, which compress the window of time during which refurbishment may still remain profitable. They show that remanufacturing is economically viable when the residual value (which takes into account model generation, storage capacity, cosmetic and functional condition) is greater than any refurbishment and acquisition costs in a short time frame, by modelling resale prices for new and remanufactured devices. Good-quality rework, like cosmetic restoration and replacing batteries, helps to slow depreciation, improve consumer confidence, and let refurbished units serve price-sensitive market segments even after new premium models have taken over the whole space. Accordingly, by shifting high-tech goods to secondary segments, remanufacturing has the effect that their economic life is extended where functional utility, rather than novelty, drives demand.

Calantone, Yeniyurt, Townsend, and Schmidt (2010) do not talk about remanufacturing in particular, but they look at motion pictures as short-lifecycle products, which brings an important parallel: competitive intensity sharply shortens the economic life of a product, reducing the future viability of any life-extension strategy. The short-lived exploitation window for a short-use product is very thin, and as competitive pressures compress the early exploitation window, then the ability to later reposition, recycle or extend exploitation of that product is further reduced. Their analysis therefore highlights the need to protect a product's early life phase as a condition for any subsequent value-recovery effort.

Mishra, Hopkinson and Tidridge (2018) draw a wider supply-chain view by looking at closed loop supply chains led by the circular economy in the FMCG sector. Their research indicates that remanufacturing and the extension of product life are contingent on product design, business models, reverse logistics and systemic enablers, including regulatory compliance and cross-sector collaborations. In the Infinite kitchen worktop case, the product has been designed of waste material as well as multiple remanufacturing cycles, but customer perception of quality and limited return flows prevented the construction of a feasible remanufacturing loop network. The Neo Eco paving system is also constructed with scrap material, and technically able to be remanufactured, but operational challenges (lack of municipal collection systems, and uncertainties about the safety of chemical agents) limit its

application. Their tool-hire model demonstrates the alternate life extension based on maintenance and repeated usage instead of end-of-life remanufacturing. Across these cases, Mishra et al. (2018) demonstrates the ability to remanufacture is required but not enough. Without adequate reverse logistics, customer acceptance and supportive infrastructure, the intended extension of product life cannot be achieved.

Collectively, these studies support the proposition of reworking and refurbishing short lifecycle products being feasible and often highly valuable, only under strict conditions. Speed in reverse logistics, accurate residual value analysis, robust warranties, high-quality refurbishment, and market strategies based on depreciation trends are critical. Competitive timing, consumer perception, and systemic supply-chain capabilities can enable or limit those loops. Consequently, remanufacturing appears as a context-dependent yet effective strategy for the extension of FMCG goods life as long as the technical, economic and logistical factors are synchronized (Gan & Pujawan, 2014; Zhou & Gupta, 2020; Calantone et al., 2010; Mishra et al., 2018).

2.7. Gaps

While the literature review has given great insights into the attributes and complexities of FMCG sector, the implications of short product lifecycles, the role of promotional packaging, the contract packaging as a key operational and strategic practice, and the sustainability challenges as well as the CE opportunities within the sector, some important gaps still need to be addressed.

A first and central gap concerns the absence of an academic conceptualisation of embellishment as a distinct set of practices in FMCG supply chains. While embellishment is widely used in practice to execute promotional formats, assemble displays, implement campaign-specific modifications, and personalise products close to market, it is not theoretically addressed in peer-reviewed literature. In contrast, related research on contract packaging provides well-established academic insights into outsourced, late-stage packaging and promotional operations. Given the strong similarities between contract packaging and what practitioners refer to as embellishment, this thesis uses contract packaging as a theoretical anchor to empirically define and conceptualise embellishment through qualitative grounded data.

Another gap is the insufficient academic evidence connecting embellishment to the well-documented downsides of short product lifecycles. As the literature highlights the volatility, compression of time, forecast error, promotional pressures, and high potential obsolescence risks of SPLCs, it is silent on whether late-stage packaging activities, such as those carried out by embellishment, support firms to adapt to those pressures. No studies investigate whether embellishment offers flexibility, whether it allows reactivity to volatile demand, or whether it mitigates the risk of stock becoming obsolete. This limitation can be addressed by looking empirically at whether embellishment helps mitigate these challenges.

A third research gap is in the sustainable implications of embellishment. Although research on packaging sustainability has analysed such topics as material use, recyclability, energy consumption and the sustainable costs of promotional packaging, such approaches have not been applied to the specific activities of embellishment. Thus, the sustainable impacts of embellishment, whether good or bad, remain unexplored. This blind spot that our research aims to fill, through the lens of sustainability theory and industry practice, investigates the sustainable trade-offs related to embellishment.

At last, there is no theoretical framework that allows firms to assess or enhance the sustainability performance of embellishment operations. While sustainable packaging and circular-economy research provide tools to evaluate materials, processes and end-of-life outcomes, the frameworks do not account for how a late-stage packaging step like embellishment fits into broader strategies for sustainability. Companies have no way to assess embellishment from a sustainable perspective, to identify levers they can use to improve, or to embed embellishment into circular economies.

The combination of these four gaps reveals both the widespread nature of embellishment and its academic disregard. The current peer-reviewed literature does not have a definition of the concept, does not consider its relationship with SPLC, does not measure its sustainable trade-offs, and presents no tools needed to assess the sustainability performance. These needs have led to the exploratory qualitative form of this thesis and form a framework that will progressively build the conceptual foundations required to explore the role of embellishment in short-lifecycle FMCG products management and sustainability goals.

3. Methodology

3.1. Research Design

The methodology adopted for this research provides a coherent framework for investigating how embellishment operations are integrated into the overall management of short-lifecycle FMCG products and the sustainability trade-offs this encounter. Since embellishment is under-researched in academics and demands a better understanding of operational and environmental context, the research utilises a qualitative and exploratory design. This methodology enables gathering rich and contextualised perspectives from practitioners who participate in FMCG activities, which is what is most appropriate for addressing the research questions.

3.2. Data collection: semi-structured interviews

In order to gain interesting pieces of information about those topics and gaps, semi-structured interviews are used. This data collection technique perfectly fit in a qualitative study context as it allows us to obtain the valuable perspectives of key stakeholders within the FMCG industry. Semi-structured interviews offer the right balance between giving the interviewees the freedom to answer as they want, while making sure the core themes and gaps we want to speak about are addressed. Moreover, giving the candidates the opportunity to express themselves more freely than it is in a fully structured interview, can lead to topics that were not originally planned and open new paths for us to investigate.

However, even though this technique seems sufficient, it is important to underline its challenges and to explain how we will counter them. Among those challenges, there is the fact that semi-structured interviews are used to collect insights and discussions as said before. Thus, we heavily depend on the interviewees subjectivity regarding the topics discussed. It can lead to potential biases in the qualitative data gathered. To tackle this, we need first to develop an exhaustive interview protocol that help us to make sure we bring consistency to the data collected. Once again, having a complete and detailed interview protocol will bring transparency and replicability to the research. The interview protocol will be developed later in the chapter. Then, it's also part of the interviewer job to be able to challenge the interviewees on the subjects covered and to bring objectivity on topics if needed. Another challenge faced when using interviews as our collection method is the participants availability. Here again, developing a good protocol will be key to manage this challenging aspect.

Furthermore, it is important to point out that the collection part is a cross-sectional approach type rather than a longitudinal one. Cross-sectional means we collect data at one point in time (here, it means we collect data once from each interviewee), while longitudinal means collecting data multiple times at different points in time. Indeed, using the cross-sectional approach seems the best choice since the time constraints and the participants availability we face. It will also allow us to collect insights efficiently and ensures minimum effort from participants when it comes to attending interview. In fact, we make sure to increase our chances of securing interviews, especially when we know that it might be difficult for participants to free up time to dedicate to such interviews.

3.2.1. Interview protocol

As discussed briefly earlier, having a well-defined interview protocol is important when opting for semi-structured interviews as our data collection technique.

3.2.1.1. Getting in touch

To get in touch with as many people as possible, using different communication channels is the right strategy.

Firstly, we use both our personal and professional network. That's to say, we ask them if they know relevant stakeholders that work in the FMCG industry. Through word-of-mouth, we try to connect with people we want to reach. In a more general way, leveraging the proximity and trust that our network has with their peers is far more effective than directly contacting people as being a stranger.

This helps to reach the participants through a diverse pool of sources. By taking this multi-channel approach, the chances of being able to reach stakeholders with valuable insights are increased. Plus, it also helps to have a diverse range of profiles, providing richer perspectives when doing the interviews. Snowball sampling is also used when interviewees recommend colleagues with relevant expertise. By leveraging the various networks, we make sure we secure interviews with busy industry professionals.

3.2.1.2. Managing the interview

After getting in touch with the upcoming respondents, it's time to plan the interviews as well as structure them.

The main way of attending the interview is through an online video call on Microsoft Teams. Online interviews have several advantages. They are easy to set up, and they don't need the physical presence of both us and the respondents. This way, it gives more flexibility for us to plan the meeting with each participant, and it reduces the time and effort required from it. This efficient way of doing also gives the opportunity to have a greater reach than in-person interviews would require, allowing us to contact a more diverse range of people. Moreover, online meeting apps like Microsoft Teams enables us to record and transcribe the video calls, which are useful when doing the data analysis. In fact, we have to transcribe what is said during the meetings since we need to do a thematic analysis regarding the insights of the participants.

Regarding the interview duration, we aim to make it lasts approximately 45 to 60 minutes, depending on the participant's availability.

When it comes to the interview structure, we design an interview guide (see appendix 1). We begin by thanking the participant for their precious time. Then, we introduce ourselves as well as the research thesis topic. We mention that the discussion will be recorded for analysis purposes, and also take the opportunity to say that a consent form can be signed stating that the data will be kept private and used only for the purposes of this research, that the interview can be anonymous (if requested) and that the participants have the right to ask for their data to be deleted (if requested, once again). These ethical considerations aim at reassuring the participant. This way, he could be more willing to share more crucial information with us.

Then, we will divide the interview flow in three parts: warm-up questions, core themes with space for more flexible discussions and then the wrap-up questions.

As far as the warm-up questions are concerned, we will ask the participant to tell his background in few words. That's to say, its current position, experience and main tasks he does within the corporation operating in the FMCG sector. The aim of this first exchange will be to win the trust of the other party so that they are more willing to share information easily. Moreover, we will make sure that the participant is comfortable with the concepts we intend to cover, to ensure that he or she answers the core questions correctly afterwards. If not, we provide them with clear and concise definitions.

Once the candidate is more comfortable and the concepts well defined, we move on to the core themes we want to address. The goal here is to use questions related to these topics and that let the interviewee respond as they want. This offers us the possibility to collect as much information as possible.

After that, it's time to conclude the interview session by asking the respondent if he has anything to add. Then, we don't forget to thank him again for his engagement towards us and offer him, if he wants, to receive the research results. Finally, we ask if we could contact him for clarification during the analysis. This could enable us to access to additional information that we hadn't thought of on the day of the interview, and it also allows us to make corrections if the information is ultimately incorrect.

3.2.1.3. Following up

The follow-up strategy is to send a thank-you email. Moreover, we offer to share the in-depth analysis once the research has been completed. This way, we show them our professional approach towards them.

3.2.2. Sample definition

This research is based on six semi-structured interviews of 45 to 60 minutes duration conducted by purposive sampling for obtaining deeper, experience-based views of embellishment practices in FMCG supply chains. Interviewees were purposively selected for their direct involvement in, or close interaction with, embellishment-related activities. In addition, interviewee diversity in roles and seniority (see appendix 2) made it possible to compare operational and strategic perspectives and helped to fill gaps identified in previous literature.

Data saturation was reached, as last interviews did not generate substantively new themes but rather reinforced and refined existing insights concerning the definition and role of embellishment, its interaction with short product life cycles, and its associated sustainability trade-offs. The recurrence of similar patterns across different functions, combined with the depth and richness of the interviews, indicates that the sample was sufficient to support robust qualitative analysis.

3.3. Data analysis: thematic analysis

Once the data collection is complete, the data needs to be analysed. To do so, we use a qualitative data analysis method called "thematic analysis". This method aims to identify repetitive patterns/themes within the qualitative data. Thus, it allows to explore stakeholders' viewpoints while making links between their discourse. Indeed, this qualitative analysis approach is the best fit to accurately look through the respondents' perceptions and experiences.

To make a good thematic analysis, we need first to transcribe the interviews records into texts. We use the transcription option for Microsoft Teams because it allows us to obtain good transcriptions efficiently. Though, it's still important to check what the app produces and correct it if necessary. In addition, thanks to the intelligent verbatim approach, we will be able to have cleaner transcriptions. In fact, intelligent verbatim helps to clean what the respondent shares by removing unnecessary fillers or details. Once the transcripts are checked and cleaned, we are now able to start the "coding" phase.

Regarding coding, a hybrid deductive–inductive approach is adopted. Four main themes are predefined, as they are directly derived from the research gaps identified in the literature review and also structure the interview guide. These themes provide an analytical framework that ensures coherence between the research objectives and the empirical analysis. Within each deductive theme, the coding process remains inductive, allowing codes and sub-themes to emerge from the respondents' discourses rather than being imposed. This makes it possible to capture participants' perceptions and experiences while identifying recurring patterns, similarities and differences across interviews, thus ensuring that the analysis remains firmly grounded in the empirical data.

Through these steps, we are sure we can make a proper thematic analysis.

3.4. Ethical and GDPR Considerations

This study adheres to the ethical guidelines and GDPR requirements. We asked every participant for their consent before doing any data collection with them, and they were fully informed about the goal of this research, the use of their data, the confidentiality measures taken and their rights regarding withdrawal at any time if they did not feel comfortable anymore to participate at this study. Moreover, all the data collected has been anonymised, securely stored, and used exclusively for academic purposes. Then, all the data collected will be carefully deleted after the completion of this research.

4. Empirical Findings

4.1. Conceptualisation and Positioning of Embellishment in FMCG Supply Chains

4.1.1. Embellishment as a transformation of already-produced products

Across interviews, embellishment is consistently defined as an activity applied to products that already exist, rather than as a form of primary manufacturing. Participant 1 explicitly frames embellishment as *“rework products that have been manufactured in factory”* and Participant 3 clarifies that it consists of *“modify the packaging of a product that already exists”*, insisting that it is carried out *“only on a product already present in our warehouse”* and that *“under no circumstances do we alter the product itself”*.

This post-production positioning is echoed by Participant 2, who describes embellishment as *“a warehouse partner”* that is *“considered as a factory for warehouses”*. In this view, embellishment operates with production-like logic while remaining structurally distinct from manufacturing plants.

Participant 2 further explains that embellishment *“collects the promotional needs and transforms them into finished products in order to deliver them to customers in the context of promotions”*, and Participant 6 adds that *“this is the service that allows to transform an existing product into another product, essentially for promotional purposes”*, reinforcing the idea that embellishment does not create products ex nihilo but rather converts marketing or sales requirements into market-ready configurations.

4.1.2. Core operations of embellishment as promotional and customer-specific formats

When participants describe what embellishment concretely does, their accounts converge around a limited set of highly promotional and customer-oriented operations. Participant 3 states that *“the largest part of our activity consists of assembling and filling displays.”*, describing them as prominent in-store structures. Participant 2 similarly refers to *“displays that are cardboard towers filled with products to improve visibility, particularly in promotional areas of the mass-market”*.

Promotional bundling is another recurrent operation. Participant 2 cites *“bundles of 2”, “1+2”, “2+1 free”*, typically assembled using *“plastic films with stickers”*. Participant 3 complements this with *“bundles of 2, 3 or 4 products”* and by mentioning *“sleeving”, “film wrapping”, and “bundling”* as common techniques used to create these promotional formats.

Beyond displays and multipacks, customer-specific requirements play a central role. Participant 5 explains *“we also develop specific products for some customers who have very precise specifications”*. In addition, Participant 1 speaks about *“RTSP (Ready-to-Sell Packaging) for specific clients”*. Plus, Participant 2 refers to *“specific boxes for certain customers”*, while Participant 3 highlights *“SRP (Shelf-Ready Packaging), that is, pre-cut boxes”* that allow retailers to *“put directly on shelf without additional manipulation”*.

4.1.3. Embellishment positioned as an intermediate stage in the supply chain

Participants consistently position embellishment between production and final delivery, although with slight variations in emphasis. Participant 2 locates embellishment *“in the middle”* of the supply chain, explaining that *“we receive the products in components from the factories, they arrive at the warehouse, then they are processed via embellishment, and then they are delivered to customers”*. Participant 1 situates it *“between the beginning and the middle”*, reinforcing the idea of an intermediate positioning. Participant 4 also locates it *“upstream of the chain”*, while Participant 5 says:

“I would say that we are more at the beginning and in the middle of the chain. The end is everything related to delivery to the customer, and we don't intervene in that. We intervene before that. Our role is really at the warehouse level.”

Participant 3 provides a more planning-oriented perspective, placing embellishment *“right after the demand planner”* and describing it as functioning *“a bit like a mini factory”*. Despite these nuances, all

participants describe the same sequence: embellishment intervenes after industrial production, when products are already in the logistics network, and before customer delivery.

4.1.4. Embellishment and contract packaging described as the same activity

Across interviews, participants do not draw a clear conceptual distinction between embellishment and contract packaging. Participant 2 states that *"I have always used the two terms as meaning the same thing"*, while Participant 1 similarly notes that *"for me, the two are intimately linked. I don't really see any difference."* Participant 6 also affirms *"both represent the same thing"*. Participant 3 adds that *"it's the same thing"* but *"it's mainly a question of vocabulary"*. This semantic explanation is reinforced when Participant 3 notes that *"in another company, they would call it co-packing"*. Participant 3 also refers to *"a co-packing service provider"* or *"a specialised co-packing cell"* when describing who performs embellishment activities.

Participant 4 nuances this equivalence by showing that distinctions between embellishment and co-packing can be organisation-specific rather than operational. Within their company, co-packing refers to *"a factory external to the company"*, while embellishment designates *"a factory that does the same things, but belongs to the company"*. However, Participant 4 emphasises that outside this internal vocabulary, *"co-packing and embellishment refer to the same thing"*, and that *"the nuance is mostly internal in my situation"*.

Participant 5 provides the only perspective that differentiates the two notions in functional terms. The interviewee associates embellishment with *"the upstream part, related to project development and production follow-up"*, and co-packing with workshop-level execution. Yet, Participant 5 stresses that these are *"two different jobs, but complementary"* and *"closely linked"*, insisting that *"one cannot exist without the other"*.

The interviews demonstrate a strong empirical consensus that embellishment and contract packaging refer to the same set of practices in FMCG supply chains. In cases where there are differences, they are primarily rooted in internal organisational structures or role differentiation rather than in fundamentally different operations. This suggests that embellishment is an empirically grounded framing of contract packaging rather than a separate supply-chain activity.

4.1.5. Embellishment as both operational execution and strategic lever

Participants describe embellishment as occupying a dual position between execution and strategy. On one hand, Participant 2 acknowledges that embellishment can be perceived as *"a role purely executive"* that *"produces according to needs"* defined by other functions such as marketing or sales.

On the other hand, several participants emphasise its strategic dimension. Participant 1 explicitly describes embellishment as *"a strategic role"* that *"is mainly used for promotional operations"* and *"which brings the most value to the company"*, while Participant 2 also refers to it as *"a true strategic pillar"*. In this strategic role, embellishment is expected to *"make recommendations"* and *"guide towards the least expensive options"* (Participant 2), rather than merely executing predefined instructions.

Participants 3 to 6 strongly reinforce this strategic positioning. Participant 3 explicitly states that embellishment is *"a strategic service,"* notably because of its reactivity: *"we can react extremely fast"* which allows major reductions in stockouts, as *"a rupture that could last two months without embellishment can be reduced to ten days"*. The interviewee also highlights its role on dead stocks, explaining that *"Instead of selling these products to discounters or destroying them, we can repackage them and put them back on sale"*.

Participant 4 emphasises the strategic role of embellishment from a consumer-facing perspective, noting that *"it is the elements stemming from embellishment that the consumer sees first"*, making it a key driver of product discovery and potential loyalty. Participant 5 similarly links embellishment to promotional performance, describing promotion as *"the shop window"* and stressing that *"if we mess*

up on the start of the season, we mess up the whole promotion", with direct consequences for commercial teams. Finally, Participant 6 frames embellishment as an increasingly strategic lever in a cost-constrained FMCG context, arguing that "a large part of the levers for productivity lie precisely in the way we manage embellishment".

4.2. Embellishment and SPLC: Risks, Late-Stage Flexibility, and Limited Corrective Effects

4.2.1. Forecast volatility and planning errors as the dominant source of SPLC risk

Throughout interviews, forecast volatility is identified as the most important SPLC-related risk irrespective of embellishment activities. Participant 1 refers to *"the volatile demand"* and notes that sales inputs *"remain forecasts"* for which *"in terms of reliability, we are not always at our best"*. Participant 2 similarly highlights *"the forecast problems"* as a structural feature of FMCG operations, while Participant 5 describes forecasting as *"the most sensitive point" that "causes the most difficulties"* in promotional contexts.

Downstream operational disruptions invariably have been traced to forecast inaccuracies. Participant 1 discusses that if sales *"intend to sell 100 boxes but only sell 30"*, this gap becomes *"one of the main causes of dead stock"*. Participant 4 reinforces this logic, stating that when *"the forecast was too high compared to what was actually sold"*, it *"creates overstock"* which, if not addressed quickly, escalates into unsellable inventory. Participant 5 similarly notes that *"if the forecasts are wrong, unfortunately, we will either produce too much or not enough"*, generating *"overstocks or shortages"*. This causal relationship is most explicitly summarised by Participant 3: *"if sales forecasts were 100% reliable, we would not have any stock shortage, overstock or dead stock"*.

Participants also emphasise planning instability over time as a key SPLC risk amplifier. Participant 1 describes late adjustments such as *"a forecast that was added a week before for the following week"* as *"very dangerous"*. Participant 4 highlights similar coordination failures on the commercial side, explaining that when a promotion is cancelled but the information *"does not go back into the systems"*, production may still take place *"due to lack of communication"*. In SPLC environments, such late or misaligned decisions sharply limit the ability to correct forecast errors.

Finally, several interviews underline the exposure of promotional, and embellishment flows to forecast volatility. Participant 5 stresses *"it is necessary for promotional products to be available in stores at time T"* which requires early commitment. Participant 6 reinforces this by explaining that for embellishment, *"the vast majority of volumes, approximately 99%, comes from promotional activities"*. In this context, forecasting is described as *"the key factor,"* and is explicitly identified as *"the main reason of situations of excess stock, shortage or dead stock"*.

4.2.2. Structural constraints: shelf life and MOQ as rigidity factors

Shelf life is described as a hard temporal boundary affecting both components and finished promotional products. Participant 1 explains that components should normally have *"at least two years of shelf life : one year so that we can use them and one year so that they can be sold once they have been embellished"*, but in practice factories sometimes deliver components with less, which *"consume a portion of the lifetime"* and *"leaves even less time to use and sell them"*. Once products fall below critical thresholds, commercial options collapse: *"once the shelf life falls below one year, it becomes much more complicated on the sales side, as we have customer agreements that prevent us from selling products with a too short shelf life in a careless manner"* (Participant 1). Participant 2 confirms that products must be sold *"one year before the expiry date"*, meaning that *"the action window is very limited"*. In embellished products composed of multiple SKUs, this rigidity is compounded: *"as soon as a SKU expires, that's it. We can no longer sell the entire embellished product"* (Participant 2).

In parallel, industrial rigidity linked to MOQ further locks in risk. Participants refer to *"MOQ (Minimum Order Quantities) imposed by the factories"* and *"minimum batch sizes for launching production"* that force early volume commitment (Participant 2). Even under low demand, *"we still launch a complete batch"*, often resulting in overstock that later expires *"because sales are not following up"*. Participant

6 also adds that when forecasts are lower than the MOQ, it *"obliges to produce very large volumes"*, which then *"remain in stock for a long time"*.

Some flexibility exists at the embellishment stage, but it is framed as economically constrained. Participant 3 notes: *"we have the advantage to be able to produce less than the MOQ. It costs more, but it is possible."*, indicating that sub-MOQ production remains an exception.

4.2.3. SKU proliferation and complexity generated by embellishment

Across all interviews, embellishment is empirically constructed as a systematic source of SKU multiplication. Participants consistently explain that any transformation of a standard product into a promotional format mechanically requires the creation of a new reference. As Participant 1 states, *"as soon as a project is created, it generates a SKU in the system."*, because there is always *"a difference between the standard SKU and the embellished SKU"*. Participant 5 confirms this structural necessity, explaining that *"from the moment we transform existing products, we are obliged to recreate SKUs"* in order to distinguish products in stock and sell formats such as boxes or displays.

This effect is reinforced by the packaging dimension of embellishment. Participant 2 highlights that embellishment adds *"all the packaging SKUs that we would not have if we did not have embellishment"*, including *"cardboard boxes as well as small clips, covers, plastic film"*. Each promotional operation therefore generates both additional finished-goods SKUs and multiple packaging references. Customer-specificity further amplifies this dynamic, as *"each customer often wants its own specific promotional campaign"*, which, according to Participant 2, means that *"we have not finished increasing the number of SKUs"*.

Several participants explicitly link this multiplication to SPLC exposure. Participant 4 notes that promotion *"forces to create multiple SKUs per season"*, while emphasising that promotional catalogues change from one year to the next, making reuse difficult. Participant 6 similarly explains that because *"these are promotional products, the references evolve every year"*, and that embellishment *"contributes inevitably to the multiplication of SKUs"*.

At the same time, SKU proliferation is actively managed rather than passively accepted. Participant 2 explains that the role of embellishment and supply teams is to *"push recommendations to simplify the SKUs portfolio"*, with the explicit aim of avoiding *"150 new embellished SKUs"* per year. Participant 5 describes systematic challenges of marketing requests, asking why embellishment should be used *"only to re-stick a label"* for instance, as this little transformation will create a new SKU. Participant 3 further indicates that past SKU inflation has been significantly reduced through *"a huge harmonisation effort on everything related to packaging"*, stating that *"we no longer have this multiplication of references as in the past"*.

4.2.4. Embellishment as a flexibility and last-minute adjustment lever

Embellishment is consistently described as a key source of flexibility in SPLC contexts. Participants emphasise its ability to intervene late in the supply chain and to react to demand signals closer to the market than industrial production. Participant 1 explicitly frames this role as structural, stating that *"that's exactly their job"* and that, thanks to embellishment, *"we can react almost until the last moment to forecast errors"*, as well as to *"unexpected demand or variations in demand"*.

Participant 3 explains that even within a firm production horizon *"over the two next weeks"*, *"we can always add or cancel production"*, highlighting that embellishment can respond to forecast variations *"in one to two weeks, which is very flexible"*. This responsiveness is repeatedly contrasted with factory rigidity, as *"most factories freeze their production plans for a month, or even two"*. Participant 5 similarly underlines that embellishment allows firms to *"modify productions, reduce them, and thus readjust the volumes according to real needs"*, and that it is *"more flexible than a traditional factory"*.

Several participants stress that this agility is reinforced when embellishment is organised locally. Participant 2 notes that when embellishment is on site, *"We can align ourselves more easily between*

distribution, customer service, and embellishment", enabling firms to *"rectify the situation more easily"* when delays or disruptions occur. Participant 4 further situates this flexibility at the end of the product life cycle, where embellishment *"becomes truly strategic...when we seek to finish at zero"*, allowing planners to avoid overproduction through close coordination with sales and promotional teams.

Though, flexibility is not unlimited. Participant 4 cautions that *"reactivity is not guaranteed everywhere"* and depends heavily on the co-packer, as some require being informed *"two or three weeks in advance"*. Participant 6 similarly points out that flexibility depends on *"the capacity available at the co-packer, notably the availability of production lines and personnel"* and on the *"safety stocks, both on packaging and on component products"*.

4.2.5. Embellishment as a limited corrective mechanism against obsolescence risk

Several participants describe situations in which embellishment avoided imminent obsolescence. Participant 1 reports a product that *"was going to fall below the one-year sales deadline"* and was recovered through *"an embellishment project in which we repackaged all these products and where we replaced the expired component with another one with a good expiry date"*. Similarly, Participant 4 recalls a regulatory failure where, as a solution, embellishment teams *"have placed a sticker on nearly one million boxes"*, which was *"very heavy operationally"* but ultimately *"enabled to avoid the destruction of thousands of units"*. Participant 5 confirms that such corrective actions are recurrent, explaining that embellishment can *"put in place reconditioning operations"* to *"readapt the product"* in order to *"avoid having dead stock"* and *"avoid destroying products that are still usable"*, while noting that *"the impact remains episodic and depends on the circumstances"*.

Embellishment is also described as a means of reallocating inventory between formats. Participant 3 explains that when there is *"some excess stock on the promotional product"* and a risk of *"out of stock on the standard product"*, embellishment can *"retransform the promotional product into the standard product"* so that it *"limits the effects of slow movers or dead stock"* and *"reduces the shortage on the standard"*. The same participant adds: *"if a promotional pack has been manufactured in factory, therefore not in embellishment, and we find ourselves out of stock on this promotional product"*, embellishment can *"very quickly use the standard product to create a promotional pack similar to the one from the factory"*, which *"helps reduce the risk of stockouts on the promotional item"*.

However, participants consistently emphasise the limits of this corrective role. Participant 2 highlights that recovery is constrained to costly or destructive options: *"Either we have to decondition, which is expensive... or we end up destroying it"*. Participant 6 further stresses that effectiveness depends on early detection and information flow, noting: *"if the problem is detected early enough and the information reaches us in time, then we can use this flexibility to avoid or limit the impact"*.

4.3. Sustainability Impacts and Trade-offs of Embellishment

4.3.1. Environmental trade-offs: material choices, waste generation, and energy impacts

In all the interviews, embellishment is consistently framed as an activity that increases ecological impact, mostly due to additional material use and waste. Participants persist in stating that it *"increases waste"* (Participants 1, 3 and 4), framing this increase as inherent to the practice. Participant 3 elaborates that *"the very principle of embellishment is to add something to an existing product"* whilst Participant 1 also suggests that *"the act of embellishing products necessarily involves using more specific packaging"*.

Waste is mainly associated with packaging and components, with a strong dominance of cardboard. Participant 1 identifies *"waste from both components and packaging sides"*, adding that *"for packaging, we mainly use cardboard"*. Participant 2 estimates that *"90% of the packaging... is cardboard"*, a view echoed by Participant 5, who states that *"everything we do is essentially done with cardboard"*. Although plastic reduction is highlighted, *"we removed the plastic from the boxes"* (Participant 2) and *"we banned everything made of plastic"* (Participant 3), participants emphasise that this does not

remove impact entirely. As Participant 2 notes, *"even if we remove the metal, there will inevitably be cardboard left"*, indicating a redistribution rather than elimination of environmental burden.

Recyclability is frequently cited but remains partial and uncertain. Carton is perceived as recyclable, *"cardboard, for me, is also recyclable"* (Participant 1), and metal as theoretically recyclable as Participant 4 tells *"metal is infinitely recyclable"*. However, Participant 5 stresses that *"metal is difficult to recycle"* because *"we do not always know the types of metals used"*. Plastic films are described as problematic, with Participant 4 stating *"plastic film, I don't think so"* when it comes to its recyclability.

Waste is further reinforced by short product life cycle dynamics. Participant 2 explains that when promotional formats cannot be sold, *"we are forced to decondition"*, while Participant 6 refers to *"expired products or products destroyed before their expiry date"* as particularly costly. Some participants insist that waste remains under their control, like Participant 6 saying *"waste related to embellishment remains our responsibility"*, whereas others describe downstream displacement. Participant 2 notes that *"it is the customers who destroy them"*, concluding that *"it shifts the destruction, rather to the end of the chain"*.

Participants also associate embellishment with additional energy use and transport emissions. Automation is described as energy-intensive: *"we do use automated lines"* (Participant 1) and *"the automated machine consumes a lot of energy"* (Participant 2). Transport impacts are particularly visible when working with external co-packers, since *"we inevitably create a round trip"* (Participant 2), mainly relying on conventional trucks: *"we use trucks...not electric trucks"*. Some mitigation practices are mentioned, such as internal co-packing where *"there is no transport by truck"* and flows are handled *"using forklifts"* (Participant 5), or shifts toward more manual operations: *"nowadays, we mainly do manual activities"* (Participant 3).

Overall, environmental sustainability in embellishment is constructed as a set of unavoidable trade-offs. Even when recyclability, plastic reduction or logistical optimisation are pursued, embellishment *"adds environmental impact"* (Participant 2). As Participant 4 summarises, *"in theory, everything can be recycled. But fundamentally, we still create products and packaging"*, highlighting the structural tension between late-stage promotional flexibility and environmental performance.

4.3.2. Economic trade-offs: embellishment as a cost centre justified by commercial performance

Across participants, embellishment is consistently framed as a cost centre rather than a direct source of profit. Participant 3 states explicitly that *"by definition, embellishment is a cost centre"* and that *"we never get money back: we spend it"*. Participant 2 similarly explains that while embellishment products are *"sold at exactly the same price as standard products"*, the industrial actor *"pays for the production of the display, the packaging of the display"*, with *"all this...offered for free to the customer"*. At the level of individual boxes or SKUs, embellishment is therefore described as *"not really advantageous"*, since *"there is a part of the production that we never recover financially"*.

This strictly cost-based assessment is nevertheless qualified when participants consider broader commercial effects. Embellishment is primarily described as a tool to *"Promote products in-store"* (Participant 1) and to sell *"in large volumes rather than in individual units"*. Participant 2 notes that *"displays sell better than standard products"* and allow firms to *"push a lot of products at once to customers"*, which *"generates revenue quickly"*. Although embellishment remains a cost, Participant 2 concludes that *"all in all, it balances itself out"* through volume effects.

Participant 3 states that *"overall, embellishment is obviously profitable for the company, otherwise we would not do it"*, while Participant 1 similarly argues that it likely reduces *"the global financial risk, because otherwise we would stop doing embellishment"*. This portfolio logic is closely tied to visibility and shelf presence: embellishment enables firms to *"remain in stores throughout the season"*, *"increase shelving capacity"* and *"increase products visibility"* (Participant 3), thereby supporting sales and market share over time.

Finally, Participant 6 reinforces that *"we do not produce products that do not generate revenue"*, while acknowledging that *"on an exceptional basis"*, higher-cost projects may be accepted to *"strengthen brand visibility"* or *"support a commercial negotiation"*.

4.3.3. Social sustainability: inclusion opportunities versus physical and seasonal strain

Participants portray the social dimension of embellishment as fundamentally ambivalent, combining meaningful inclusion and job creation with physically demanding work and strong seasonality. Participant 2 explains embellishment is an *"assembly-line work"* and *"a job that is quite physically exhausting"*, making it *"a complicated field"* that must be *"really well supervised"* to avoid social risks. To address physical strain, participants point to concrete safeguards: workers *"change stations very regularly to avoid muscular problems"*, attention is paid to *"musculoskeletal disorders"* (Participant 2), and warehouses operate within *"a proper social framework"* (Participant 4), with strong oversight on safety and accidents. In some cases, technical solutions such as *"a kind of exoskeleton made available to employees"* are used to reduce *"by approximately 40% the weight of the boxes or displays they have to carry"* as Participant 2 shares.

At the same time, embellishment is widely framed as a vector of social inclusion and employment. Participant 5 highlights the involvement of *"people with disabilities"* within *"a sheltered workshop"*, which enables *"a truly inclusive approach"* and *"to create sustainable employment"*. Participant 3 further confirms it by mentioning: *"The biggest social impact, it's that we work... with people with disabilities"*. Embellishment is also described as creating jobs in less dynamic areas and, in some cases, involving *"people undergoing professional reintegration"*, placing these activities *"in a spirit of inclusiveness"* (Participant 2).

However, this social value has also been limited to a certain extent by high seasonal volatility. Participant 1 observes how embellishment *"operates largely on a seasonal basis"* and with intense peaks that *"inevitably generate a lot of workloads"*. For workers, this means *"some pretty long workdays and lots of stress"*; and working conditions are *"not always easy"* (Participant 5). Co-packers depend on interim staff to absorb these peaks, resulting in *"activities that are truly inconsistent"*, where teams are repeatedly expanded and reduced (Participant 4).

4.3.4. Perceived sustainability versus operational reality

Across the interviews, participants consistently describe a gap between how sustainability is perceived through their consumer lens and the real sustainability performance of the products. Visual cues strongly shape these perceptions. Participant 1 explains that *"as soon as you see something transparent made of glass, you will think it seems durable"*, while Participant 2 similarly notes that *"the colours used on packaging have a significant effect on the brain"* and that *"when you add green, white, leaves, trees...it feels more eco-friendly and sustainable"*. Sustainability is therefore often inferred from aesthetic signals rather than from an assessment of actual material composition.

These perception mechanisms are actively mobilised within embellishment and marketing practices. Participant 1 describes how marketing teams decide and adapt strategies *"depending on the type of customer we are targeting"* to determine *"which product will be the most attractive for the consumer"*. This is confirmed by evolving consumer expectations, as Participant 1 notes that *"when we know that consumers are more and more drawn to sustainability, this inevitably impacts what marketing and embellishment do"*, framing embellishment as a communication tool aligned with sustainability narratives.

At the same time, participants highlight the limits of this signalling and the persistence of unchanged operational realities. Participant 4 observes that *"with social media, it's quite easy to create a sustainable impression of a product"*, even though *"what's inside remains the same"*. This is illustrated with a packaging that looks *"very natural with green colours"*, while containing *"a metal object, with batteries, and... plastic"*. This shows how embellishment, in practice, can change perception without a reduction in material intensity or waste.

Lastly, this gap is reinforced by operational decisions whereby costs and aesthetics often prevail sustainability outcomes. Participant 5 explains a project in which plastic was replaced with packaging “90% of paper” and which was considered as a “very nice project” for its sustainability aspect but which was scrapped as “the paper version did not look the same as the plastic version” and “from the consumer’s point of view, it must have created a bit of a barrier.” Whereas Participant 6 mentions that “plastic is becoming less and less acceptable”, and for that matter “if the packaging is more attractive or perceived as more sustainable, this can clearly play in its favour”. Therefore, embellishment decisions are driven more by visual expectations, cost constraints and marketing priorities than evidence-based environmental improvements.

4.4. Measuring Sustainability Performance and Circularity Potential of Embellishment

4.4.1. Lack of structured sustainability measurement and reliance on indirect indicators

Across the six interviews, participants unanimously report that the sustainability performance of embellishment is not formally measured. This absence is expressed very explicitly. Participant 2 states “No, we don’t really measure it”, while Participant 3 confirms that “to my knowledge, we don’t measure at all the durability of what embellishment does”. From an operational and planning perspective, Participant 1 similarly underlines that “as for planning or embellishment, no, not at all”, indicating that sustainability of embellishment activities is not assessed.

As Participant 2 points out, “one of the KPIs that we still track in the context of sustainability is the destruction rate”, conceptualizing destruction rate as to determine the inefficiency or waste, rather than environmental impact itself. The same participant also states that “we measure embellishment productions, but this is not done with sustainability in mind”, reiterating that current measures are focused on volume and execution as opposed to sustainability.

Where data on sustainability is available, it is often external to the embellishment function. Participant 4 notes that “the co-packer has tools to calculate at least the environmental impact” and that “this is an information that we can ask them for, and they provide it to us”. However, these data are not part of a structured internal measurement system for embellishment.

Finally, sustainability concerns are predominantly guided by qualitative judgment and broad instructions, rather than measurable objectives. Participant 3 refers to “guidelines, such as the ban on plastic, but this is not being monitored”, and Participant 5 describes an expert-based logic: “we will analyse them and respond by providing our point of view”, at times warning that “this project is not necessarily going in the right direction” in terms of cost or durability. Meanwhile, and in the future, the measurement may be driven more by external regulation, since Participant 6 is confident that “with the arrival of taxes, we will have to precisely calculate the volumes of cardboard used, particularly in order to be able to pay these taxes”, which indicates that the measures would be based on compliance.

4.4.2. Identified data gaps and lack of structured reporting

Participants consistently point to clear data gaps rather than uncertainty about what should be measured. Participant 1 explicitly mentions missing figures such as “how many cardboard boxes and pallets have we thrown away each year» and “how many pallets have been reused”. Similarly, Participant 4 asks “do we really compute the loss?” or “do we analyse what is donated, what is destroyed, and what is reconditioned?”, before concluding “honestly I don’t think so”. These statements show that relevant sustainability data are identifiable but not structurally captured.

The absence of reporting also affects end-of-life visibility. Participant 2 underlines that “we have no idea how customers destroy the packaging” and insists on the need to “follow the packaging from start to finish” to know “if it is recycled”. This lack of traceability is mirrored internally, as Participant 5 explains that “there isn’t really any structured follow-up” and that, in practice, “we simply send a message to the co-packer telling them what needs to be eliminated”.

From a grounded perspective, this subtheme highlights that sustainability gaps are driven by organisational and informational gaps, rather than by a lack of awareness or interest among stakeholders.

4.4.3. Reactive circular practices and limitations

Across participants, circular practices are described as existing within embellishment operations, but they are not articulated as part of a deliberate or formal circular economy strategy. Instead, they emerge pragmatically to avoid waste when problems occur. Participant 1 refers to *"the reuse of components"*, *"much more modular designs"* and *"relabelling...instead of throwing away a product when we realise that there is something that is not compliant"*, while Participant 2 similarly states *"that's what we already do"*, notably by recycling cartonnage *"to avoid destroying them"*. These accounts indicate that circularity is present in practice, but primarily as an operational response rather than a structured sustainability approach.

Other concrete recovery actions are repeatedly mentioned across interviews. Participant 2 notes that *"as soon as we have boxes left over in stock, we try to decondition them to recover as much of the products inside as possible"*. Participant 5 reinforces this logic by stating they *sometimes "rework products that are no longer sellable in their current state"* and highlighting that relabelling allows *"to bring the products into compliance"* in order to *"avoid unnecessary destruction"*.

At the same time, participants emphasise strong material and temporal limits that restrict circularity, especially after products enter the retail environment. Participant 6 clearly states *"I don't think that circular economy can be fully applied to embellishment"*, particularly *"not in a logic of recovery after being placed on the market"*. Promotional specificity further constrains recovery, as Participant 2 observes that *"embellishment products are much harder to resell"*, reinforcing the upstream focus of circular actions.

Finally, although some reuse is possible internally, Participant 3 explains that recovering metal modules at end of season would require *"a huge number of collection points"*, concluding that it is *"far too complex, impossible to put into practice"*. Participant 6 similarly stresses that circularity mainly applies *"before the products are released"*, through *"reuse existing components"* or *"reuse modules from the previous year"*.

4.4.4. Practitioner-identified levers for sustainability improvement

When asked about sustainability improvement, participants consistently identify pragmatic, operational levers rather than transformative circular solutions.

A first dominant lever is standardisation and harmonisation of packaging formats. Participant 1 highlights *"the standardisation of all packaging"*, explaining the use of *"the same packaging for multiple boxes or modules"* is a *"very good initiative"*. This is reinforced by Participant 2, who argues for *"avoid having too many designs"* and using packaging *"which works for all brands and all SKUs"* to avoid destruction and unnecessary SKU proliferation. Participant 5 illustrates the scale of this effort, noting a reduction from *"approximately 2,500 packaging references"* to *"about ten references"*, confirming that simplification is already a major sustainability axis in practice.

Apart from standardisation, participants also stress design simplification combined with material removal. Participant 3 maintains *"what would really make a difference would be to reduce the number of pieces on which there is design"*, which further links sustainability with the reduction of decorative complexity. Participant 6 similarly calls for *"simpler designs, using only one type of material"* and *"more modular formats"* in his statement, whereas Participant 5 argues on the other hand that they have been aiming to *"remove everything that was not essential"*, removing anything that *"did not bring any real added value"*. Material choices are mentioned as a lever, but often as an already addressed baseline, with Participant 1 noting that *"using recyclable materials for cardboard boxes, but that's something we already do"* and Participant 2 insisting on materials that are *"recycled or recyclable"* and do not become *"waste for nature"*.

Another constant lever is the quality of planning and forecast's reliability, which participants associate directly with waste production. Participant 2 says that "if we're not good at planning, we generate dead stocks," and Participant 1 calls for "ameliorate the rapidity of order reporting" to better anticipate customers cancellations and workload peaks. Participant 5 too emphasizes the need to "make the forecast more reliable" while Participant 6 highlights planning improvement as "to limit forecasting errors, which are often the cause of waste".

Finally, participants underline the importance of cross-functional and upstream collaboration, combined with process optimisation. Participant 3 argues that sustainability improvements require *"work with factories"*, notably through proposals such as *"a unique box, respecting the technical specifications"*, which would reduce *"the costs, the delays, the complexity of the business"*. Participant 5 similarly notes that simplification *"necessarily involves dialogue with the other departments concerned"*, particularly marketing. In addition, Participant 1 identifies automation as *"a key lever"*, citing *"the use of AI and Power Query"* alongside training needs.

5. Discussion

Following the deductive-inductive thematic analysis from the previous chapter, the discussion covers the same four deductive themes that informed the structure of the findings chapter. These themes were directly built upon the research gaps that were identified within the literature and provide a cohesive framework to evaluate convergence, divergence, and theoretical contribution to existing research and the empirical data.

5.1. Conceptualisation and Positioning of Embellishment in FMCG Supply Chains

The first deductive theme relates embellishment to contract packaging research as academic exploration rarely shows much thought for embellishment. As evidenced by the literature, embellishment is absent in academic research. On the other hand, contract packaging is widely recognised as a late-stage process that contributes to value in FMCG supply chains, located between manufacturing and distribution and primarily concerned with secondary packaging operations like kitting, bundling, labelling and the assembly of promotional formats (Forcinio, 2019; Forcinio, 2023).

The empirical evidence supports that framing nicely. Throughout interviews, embellishment is consistently defined as a transformation applied to already-produced products. It is therefore more of a post-production activity than a manufacturing process. Participants repeatedly emphasize that embellishment only occurs when the products are inside the warehouse or flow of the logistics system, and does not affect the product itself. This is consistent with literature definitions of contract packaging highlighting late-stage packaging, promotional assembly, and secondary packaging tasks as opposed to primary production processes (Forcinio, 2019).

The results also reinforce the intermediate placement of embellishment in FMCG supply chains. Interviewees regularly relate embellishment between factory output and customer delivery, as they describe it as a “mini factory” embedded into logistics operations. This coincides closely with the literature’s conception of contract packaging as an interfacial process across upstream manufacturing and downstream market execution, facilitating product differentiation once the industrial production stage has already occurred (Forcinio, 2019; Forcinio, 2023).

The findings also explain why embellishment is still under-theorised. Practitioners overwhelmingly refer to embellishment and contract packaging as operationally identical, with differences being driven by internal organisational terminology or structural arrangements. This empirical equivalence addresses the semantic gap we found in the literature review: embellishment does not denote a missing practice but rather a practice that was described in a different academic title. By empirically anchoring embellishment in contract packaging theory, this research provides a conceptual bridge that joins academic terminology with industry terminology.

Lastly, the findings clarify the literature’s characterization of contract packaging as either operational or strategic. As an increasing body of academic literature frames contract packaging as a strategic partner (Forcinio, 2019; Forcinio, 2023), the interviews indicate that embellishment occupies a hybrid role, playing a dual role, both as an operational layer for promotional activities and as a strategic lever for controlling cost, reactivity and operational risk within the volatile environment of FMCG.

5.2. Embellishment and SPLC: Risks, Late-Stage Flexibility, and Limited Corrective Effects

This second deductive theme examined whether embellishment mitigates or exacerbates the operational challenges associated with short product life cycles (SPLCs). The literature characterises SPLCs by strong demand volatility, compressed selling windows, irreversibility of early decisions, and a high risk of obsolescence (Tomlin, 2009; Gan & Pujawan, 2014). The empirical findings strongly converge with this perspective, confirming that forecast errors and planning uncertainty are the dominant sources of SPLC risk. The interviews confirm that embellishment does not eliminate these structural risks but operates within them.

Structural constraints identified in the findings further reinforce these limits. Shelf-life requirements act as hard temporal boundaries that sharply restrict corrective options for promotional and multi-SKU products, in line with deterioration-related SPLC dynamics (Tiwari et al., 2024). In parallel, minimum order quantities (MOQs) function as operational rigidity factors that force volume commitments and amplify the consequences of forecast errors. Although MOQs are not identified in the literature as primary drivers of short product life cycles, the findings show that they act as operational constraints that reinforce SPLC dynamics by forcing volume commitments that are difficult to adjust once promotional periods begin.

The findings add nuance in the role of embellishment as a late-stage flexibility lever. In line with contract packaging literature, embellishment facilitates adjustments much closer to the needs of the market than to the products produced upstream, through product reconfiguration, volume adjustment or end-of-season balancing (Forcinio, 2019). Compared to industrial production, embellishment offers shorter lead times and greater responsiveness, particularly when organisational proximity and information flow are strong. This flexibility explains why embellishment is repeatedly mobilised to absorb volatility and manage demand fluctuations in SPLC contexts.

However, the empirical evidence clearly demonstrates that this flexibility is bounded, costly, and highly contingent on timing and coordination quality. Once products approach expiry thresholds, once promotional windows close, or once inventory is fully committed, embellishment loses most of its corrective capacity. Rather than constituting a solution to SPLC risk, embellishment functions as a buffering mechanism that mitigates some downstream consequences of forecast errors without correcting poor planning. This contributes to SPLC theory by clarifying the bounded and realistic scope of late-stage interventions in short-lifecycle FMCG systems.

5.3. Sustainability Impacts and Trade-offs of Embellishment

The third deductive theme investigated the sustainability implications of embellishment for the environmental, economic and social dimensions, as well as the gap between perceived and actual sustainability. Literature review revealed that promotional packaging is more resource intensive and burdensome environmentally, but it is also economically justified by its commercial performance (Dörnyei, 2020; Ma, Park & Moultrie, 2020).

The results provide a strong grounding of these theoretical predictions. From an environmental point of view, embellishment is consistently linked to increased material use and energy consumption and waste. While the utilisation of recyclable materials and plastic minimisation align with the overall sustainable packaging strategies (Dantas et al., 2023), the empirical results suggest that these measures are most efficient in reducing rather than eliminating environmental impacts when implemented at the embellishment stage.

From an economic view, the results are found in line with the literature's perspective of promotional packaging being a cost centre that is explained by sales acceleration, shelf presence, and commercial success (Fornari, Grandi & Fornari, 2009). So, although embellishment is not profitable in itself, companies are still relying on it as, in highly competitive FMCG markets, not using it would cost them even more. This is consistent with previous studies that highlight the continued tensions between cost efficiency, speed-to-market, marketing objectives, and sustainability ambitions.

While social sustainability has been underrepresented in packaging research in general, the findings provide a key empirical contribution to the literature. The findings illustrate a dual truth: while embellishment can bring both inclusion and employment pathways, including sheltered workshops and reintegration initiatives, it also involves physically demanding, seasonal and high-pressure work. Such duality shows that the social implications of embellishment are both positive and negative.

Lastly, the results are consistent with the literature on perceived versus actual sustainability. Even when the material composition of the product is left to remain the same, a consumer's perception may still heavily be influenced by aesthetic cues, colours and design elements. This is consistent with research

on sustainability signalling and consumer misperception (Steenis et al., 2017; Das, 2022) and emphasizes embellishment's role as a communication tool, enabling a product to appear more sustainable without a corresponding operational improvement.

5.4. Measuring Sustainability Performance and Circularity Potential of Embellishment

On the fourth deductive theme, it refers to the absence of formal frameworks to analyse sustainability performance and determine circularity potential of embellishment activities. The literature review showed that sustainability, circular economy and sustainable packaging frameworks have been widely articulated in the FMCG context, but rarely are these frameworks integrated with late-stage packaging and promotional activities such as embellishment. Remarkably, circular economy literature continues to focus on end-of-life recycling metrics, neglecting operationally embedded, short lifecycle processes where value could be delivered close to the market (Schöggel, Stumpf & Baumgartner, 2020).

The empirical evidence confirms this lack. For all interviews, they claim that the sustainability performance of embellishment is not measured with dedicated KPIs. Current measurements are only indirect indicators (e.g., destruction rates) rather than comprehensive sustainable and circular performance measures. This reflects with the literature developing that sustainability assessment in FMCG supply chains is fragmented and primarily compliance-driven, wherein firms tend to respond to external pressures without embedding sustainability in the operational control structure (Prashar, 2023). Where environmental data exists, they usually lie with external co-packers and are not incorporated into an internal governance or reporting framework for embellishment efforts.

In terms of circularity, the findings align closely with circular economy literature that criticises the dominance of low-value loops, such as recycling and waste avoidance, over more transformative practices (Schöggel et al., 2020). Circular practices associated with embellishment are predominantly reactive and upstream-oriented. They include deconditioning, relabelling, reuse of components, or reuse of modules from previous campaigns, all of which occur before products are deployed in retail environments. Once promotional products reach the market, recovery, reuse, or reverse logistics are described as logistically complex and economically unfeasible.

Importantly, the findings show that practitioners are not unaware of sustainability challenges. Instead, the improvement levers identified (standardisation, harmonisation, simplification, and planning optimisation) reflect a pragmatic, risk-reduction logic rather than a transformative circular redesign. This operational rationality is consistent with the literature describing FMCG value chains as structurally linear systems optimised for speed, volume, and promotional responsiveness, where sustainability improvements tend to be incremental rather than systemic (Kuzmina et al., 2019).

6. Recommendations

Further research work should incorporate quantitative sustainability assessments to further explore sustainability trade-offs tied to embellishment. Such quantitative tools when assessing embellished products configurations would help researchers to go beyond perceived sustainability to evaluate actual environmental performance. This will be particularly useful in understanding if embellishment is a main contributor to the increasing environmental burden or as a means, under certain conditions, to reduce waste and optimise resources, by better matching demand and avoiding obsolescence.

Additional research should further investigate, in a more explicit way, the role of embellishment within the strategies of a circular economy. Thus, although this thesis demonstrates that circular practices associated with embellishment are largely reactive and oriented towards the upstream, future work can explore how embellishment can be intentionally constructed to facilitate the wider circular economy, including the downstream.

Speaking of the end of the chain, the integration of both consumer and retail perspectives into the analysis would allow deeper comprehension of the perception, handling, and disposal of embellishment products and thereby bridge the gap between sustainable operational efforts and downstream impacts.

Finally, future studies may assess embellishment from a managerial decision-making and governance perspective. Decisions on embellishment are often influenced by marketing pressures, by timing constraints and by short-term commercial priorities, while sustainability considerations remain weakly formalised according to this thesis. Thus, future studies could investigate how embellishment is governed internally, how trade-offs among marketing, operations, cost, and sustainability are arbitrated, and how decision-making frameworks determine the environmental and economic consequences of embellishment. This study will be of value to the literature through understanding embellishment as an operational activity, but also as a governance and coordination challenge in FMCG organisations.

7. Conclusion

This thesis aims to identify whether embellishment is truly a sustainable strategy to manage short product life cycles in the FMCG sector and not just a means to shift sustainability challenges elsewhere in the supply chain. The research is guided by an exploratory qualitative design and six semi-structured interviews with industry practitioners, providing a clear answer.

In this thesis, we define the term "embellishment" and how it relates with contract packaging. The evaluation of the concept from an empirical standpoint highlights the consensus among practitioners: embellishment is late-stage packaging and reworking activities applied to previously manufactured goods and their promotion or customer-specific applications. In reality, embellishment and contract packaging are essentially functionally the same. However, the differences that exist consist primarily of organisational or semantic characteristics. This thesis contributes to filling an important conceptual gap in the academic literature by empirically rooting embellishment in contract packaging theory.

Then, the sustainability challenges stemming from short product life cycles, namely, demand volatility, uncertainty in forecasting, compressed selling windows, shelf-life limitations and minimum order quantities are structural elements in FMCG supply chains. These problems arise upstream of embellishment and systemically create overstock, obsolescence and waste.

Furthermore, the results indicate that embellishment can mitigate certain of the SPLC-related effects, but only under certain conditions. Embellishment serves as late-stage flexibility and buffering mechanism, allowing volume adjustments, product reconfiguration, and even, in some cases, at-risk stock recovery. Though, it does not eliminate SPLC risks nor mitigate against deficiencies in upstream planning. In the case of the corrections possible through embellishment, they are time-dependent and contingent, depending on early intervention and coordination.

Moreover, we argue that embellishment creates unavoidable sustainability trade-offs. It enhances the use of material, packaging waste, transport flows, and energy consumption; operates economically as a cost centre justified by commercial performance; and integrates social inclusion opportunities with physically demanding and seasonal work. Additionally, embellishment can enhance perceived sustainability, without creating equivalent sustainable improvements.

Altogether, this research concludes that embellishment is not a fully sustainable solution, nor is it just a displacement of sustainability problems. It's a conditional and limited mechanism which can cut down certain types of waste given well-designed governance but will also introduce new environmental and operational trade-offs. Thus, its sustainability value lies not in its simple existence, but on how it is planned, measured, incorporated and integrated into broader supply-chain strategies.

8. Appendices

Appendix 1: Interview guide

I. Warm-Up & Context

1. Could you briefly introduce yourself and your current role?
 - *How long have you been working in the FMCG sector?*
2. Are you familiar with concepts such as short product life cycles (SPLC), promotional packaging, or sustainability?

II. Theme 1: Defining Embellishment & Its Position in the Supply Chain

3. How would you define “embellishment”?
4. Could you describe the main operations done by embellishment?
 - *Give examples of embellishment products.*
5. Who typically performs embellishment: internal teams, co-packers, 3PLs, external providers?
6. Does embellishment interact with other departments? In what ways?
7. Where does embellishment sit within the supply chain?
 - *Why is it positioned at that stage?*
8. Is embellishment the same as contract packaging? If not, what are the differences?
9. Literature suggests contract packaging becomes a strategic, integrated partner.
 - *Does embellishment play a similar strategic role in your organisation, or is it mostly operational?*

III. Theme 2: Embellishment & Short Product Life Cycles (SPLCs)

10. From your experience, what are the main reasons for overstock, shortages, or dead stock regarding SPLC?
11. Do embellishment operations influence inventory management, production planning, or logistics? How?
12. Does embellishment bring flexibility by allowing decisions to be made closer to real demand?
 - *Does it help reduce forecasting errors or react to unexpected demand fluctuations?*
13. SPLC and promotional packaging tend to increase the number of SKUs according to the literature. Does embellishment also create SKU proliferation? How do you manage it?
14. To what extent can embellishment compensate for earlier supply-chain issues?
 - *Does it really reduce obsolescence? Or are its effects limited?*

IV. Theme 3: Sustainability Impacts of Embellishment

A. Environmental

15. Does embellishment tend to increase or reduce waste? Why?
16. What types of waste occur most frequently in embellishment operations?
17. Does embellishment add extra materials? Are these recyclables in practice?
18. Does embellishment sometimes shift waste upstream/downstream rather than managing/reducing it? If yes, have you some examples?
19. Does embellishment generate additional GHG emissions and energy use? What type of transportation is currently used?
20. Do you feel regulatory pressure or consumer pressure regarding sustainability? How does it influence embellishment?

B. Economic

21. What internal tensions arise between cost, speed-to-market, marketing ambitions, and sustainability?
22. Does embellishment reduce risk of financial loss? If yes, how ?

C. Social

23. Does embellishment have social impacts or challenges? Which ones and how are they managed?
24. Are there any social initiatives implemented by the embellishment? If yes, have you some examples?

D. Consumer perception vs reality

25. As a consumer, do you observe a gap between what you perceive to be sustainable and what actually is sustainable?
 - *What is the impact on embellishment decisions?*

V. Theme 4: Sustainable performance assessment & Circularity

26. Does your company currently measure the sustainable performance of embellishment? If yes, how?
 - *Which KPIs or tools are currently being used?*
27. What other KPIs or tools are needed to better assess the sustainable performance of embellishment?
28. What initiatives would make embellishment more sustainable?
29. Could circular-economy approaches apply to embellishment? If yes, which ones and how ?

VI. Wrap-Up

30. Do you have any additional thoughts you want to add that we have not covered?
31. Would you like to receive the results of the research?
32. May I contact you again if clarification is needed during analysis?

Appendix 2: Participant's role and seniority

Participants	Current Role	Seniority in FMCG sector
Participant 1	Supply Planner Embellishment	3 years
Participant 2	Logistics and Embellishment Manager	8 years
Participant 3	Embellishment Project Planner	40 years
Participant 4	Pharma Supply Manager	9 Years
Participant 5	Embellishment Project Planner	35 Years
Participant 6	Embellishment Supply Manager	More than 10 Years

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Executive Summary

FMCG sector is known for its short-lifecycle aspect, high promotional intensity and growing pressure regarding sustainability. In this context, embellishment involves late-stage packaging and product reconfiguration performed on already produced products. Although used in practice, embellishment is generally missing from academic studies. The thesis fills this gap by anchoring embellishment to the existing literature on contract packaging.

This study provides a conceptualisation of embellishment, analyse its relation to short-lifecycle products management and its impact on sustainability. A qualitative and exploratory research was performed, based on six semi-structured interviews with FMCG professionals regarding embellishment and contract packaging operations. The data were analysed with a deductive-inductive thematic analysis that focused on four research themes directly linked to the gaps of the literature review.

The findings indicate that embellishment is equivalent (empirically) to contract packaging. It is an intermediary step between manufacturing and distribution in the supply chain. It provides late-stage flexibility, allowing companies to respond to volatile demand, adapt promotional volumes, and avoid obsolescence by reworking existing inventory in some cases. However, this flexibility is constrained by structural limits, including forecast inaccuracies, shelf-life, and minimum order quantities.

Concerning sustainability, embellishment creates trade-offs. Although it prevents economic or environmental waste by saving products from destruction and recovering value from at-risk stocks, it increases use of material, packaging, energy and transport. Socially, embellishment offers inclusion and employment but causes physically demanding and seasonal-dependent work. Moreover, sustainability performance is not measured, and circular practices are reactive as well as upstream-oriented.

In conclusion, embellishment is not a fully sustainable solution. Rather, it is a mechanism allowing companies to mitigate short-lifecycle risks through increased flexibility and reduction of waste. Nevertheless, such benefits are being counterbalanced by further use of materials, energy, and low circularity, meaning sustainability problems are often displaced rather than directly resolved.

KEYWORDS: *Fast-Moving Consumer Goods (FMCG); Embellishment; Contract Packaging; Short Product Life Cycles (SPLC); Promotional Packaging; Late-Stage Packaging; Supply Chain Flexibility; Sustainability Trade-offs; Waste Reduction; Inventory Obsolescence; Circular Economy; Sustainability Performance Measurement.*

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