Chapter 4
From Click to Conscious Choice:
Algorithmic Nudging Architectures for Eco-Friendly Fashion Consumption

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ABSTRACT

This chapter offers a socio-technical blueprint for algorithmic nudging in fashion platforms. It defines nudging as the data-driven orchestration of choice architecture that steers customers toward lower-impact products, slower shipping, and fewer returns, while preserving autonomy and fairness. The chapter outlines a layered architecture that spans data, modeling, policy, and interface actions, linking interventions to psychological mediators such as salience, perceived consumer effectiveness, trust, and reactance. It formalizes governance through transparency, explainability, opt-out options, fairness screens, and human oversight. A measurement and experimentation program specifies primary, perceptual, and composite KPIs, including Carbon per Conversion, Impact@K, FairExposure, and the Autonomy Cost Index, along with A/B tests, uplift targeting, contextual bandits, and off-policy evaluation. Practical thresholds and reporting cadences support safe operation. The chapter closes with sectoral guidance, limitations, and implications for policymakers and practitioners.

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1. INTRODUCTION

Global fashion continues to generate significant environmental pressures, including water use, energy demand, chemical inputs, waste, and reverse logistics, alongside persistent social externalities such as labour precarity and opaque supply chains (Hyun et al., 2021; Aydin, 2025). Over the last decade, brands have proliferated sustainability claims and labels; yet, conventional informational tools such as eco-labels (Lee et al., 2015; Lou & Xu, 2024), CSR pages (Dourado et al., 2024), and sustainability badges (Assaker & O'Connor, 2023) rarely translate declared concern into consistent behavior. At the moment of purchase, many consumers still fall back on habit, hedonic appeal, convenience, or price (Kapoor et al., 2025). In parallel, AI-driven recommendation systems, dynamic pricing, search ranking, and interface personalization have begun to reshape digital choice environments in fashion e-commerce and mobile applications. This socio-technical shift has a double edge. It can accelerate fast-fashion impulses through infinite scroll, urgency cues, and subtle frictions that privilege short-term rewards. It can also support more sustainable decisions if it is designed and governed as an ethical form of algorithmic nudging that protects user autonomy, transparency, and fairness.

In this chapter, algorithmic nudging refers to the systematic,data-driven, and continuously optimized orchestration of micro-decisions within digital choice architecture. The core question is what the user sees, in which order, and at which moment. The purpose is to gently steer choices toward predefined sustainability outcomes such as lower-carbon shipping, more durable or ethically produced items, and reduced return propensity, while preserving meaningful autonomy and explainability.

Algorithmic nudging differs from static interfaces (Mattis et al., 2024). A universal “green shipping” default is a one-size-fits-all intervention. An algorithmic approach utilizes machine-learning pipelines that determine in real-time what to show, to whom, and when. Contextual bandits identify which intervention is most promising for the present user state, then update beliefs through rapid learn-and-test cycles. Reinforcement learning optimizes a policy over time so that the system improves against explicit sustainability goals, such as emissions reduction or the probability of choosing a lower-impact option (Ayabe et al., 2025). Collaborative and content-based filtering personalise exposure by learning from adjacent preference profiles and item attributes. Causal uplift modelling adds a crucial safeguard by estimating whether an intervention is likely to change behaviour, rather than targeting consumers who would choose the sustainable option anyway. Through iteration, the system refines which sustainability-relevant interventions are displayed to which users and at what times, with the promise of closing the intention-action gap at a segment-of-one granularity.