

Behind the Bouquet

The Hidden Costs of the British Cut Flower Industry

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1 Background

British agriculture industry has played a foundational role in the economic, cultural, and environmental landscape across the country. In a report published by the Department for Environment, Food & Rural Affairs (DEFRA) in 2025, the industry has contributed £2.57 trillion to the economy and supports nearly 500,000 jobs. Of that, roughly £3.7 billion comes from vegetable and flower growers, who make up approximately 3% of farms in the UK (Department 2025).

The British floriculture¹ industry is an unsung hero in supporting farmers nationwide, but underneath its blossoming economic activity, lie many hard truths. Over the last few decades, the number of British flower farmers has dramatically fallen: for example, in the 1970s there were over 120 chrysanthemum flower growers across the nation, and now there are none (Taylor 2025).

Throughout history and across many cultures, flowers have become symbols for celebration, empathy and love, generating positive emotions and social connotations. In the words of Prof Haviland-Jones (2005), “the simple presentation of flowers, even a single flower, will release a strong and immediate behaviour reflecting positive affect.” However, when people think of flowers, they are often indignant to the truth behind the bouquet.

Nearly 90% of the flowers sold in the UK are in fact grown abroad (Taylor 2025). Leading the world flower market are growers from the Netherlands, Kenya, Columbia and Ecuador, all of whom export flowers to markets including the UK. Consumers want ‘perfect flowers’ year-round, flowers that must be beautiful and long-lasting, so retailers developed strict quality standards which require producers to meet them. In practice, the cost of a flawless bouquet amounts to pesticides and fertilizers being used to speed up growth and protect the flowers, contributing to greenhouse emissions. This system is a self-reinforcing loop as consumers demand perfection, and producers must meet that demand if they want to stay in business.

¹ Floriculture is the cultivation and management of ornamental plants, especially flowers (Merriam-Webster Dictionary).

To tackle where an intervention might take place, our team grouped the problems into three layers. The first layer is analyzing the environmental problems associated with the flower industry. Carbon (CO₂) emissions are a leading cause of environmental issues caused by the flower industry. Flowers From The Farm (FFTF), a British trade association, conducted a study regarding the amount of CO₂ per flower stem, comparing British bouquets, with Kenyan and Dutch bouquets. Their results show, “A locally outdoor grown bouquet of mixed garden flowers is estimated to have even lower CO₂ emissions, around 5% of the Dutch or Kenyan bouquet” (Swin 2024). Even just a single Dutch lily stem emits 3.478 kg CO₂ when imported to the UK, whilst a British one emits 0.819 kg CO₂. That is nearly a ¼ difference in carbon emission based on a single stem. Say a consumer were to buy 6 Dutch lily stems, that would equate to roughly 24 kgs of CO₂ emissions, more than a Christmas Turkey dinner with vegetables which produces 19 kgs of CO₂ (Swin 2024). Carbon emissions are only one layer of issues with the flower industry.

The second problem is regarding human health and ethical issues. To meet the high demand of consumers, producers use harmful pesticides to ensure their flowers meet consumer and retailer standards. Nearly 85-90% of all arable crops in the UK, under which flowers fall, use pesticides (Department 2025). Although specific data could not be located due to a large gap in research involving UK flower farmers, if one were to use the data from DEFRA in conjunction with this statistic, one can deduce that roughly 400,000 farmers use pesticides in their farming practices (Department 2025). Pesticides have been linked to increases in cancer, brain disease, and liver failure, calling into question their true value in farming practices, which of course, include flower farming.

The final layer identified is the lack of consumer awareness regarding the plights of flower farming. Currently, most retailers do not show information about the sourcing of their flowers as there is no regulation in the UK that requires retailers to disclose flower origin as there is with food regulation. Consumers are then unaware of just how unsustainable the flowers they buy are bad for both the planet and farmers. Brands such as M&S (Marks) are an example of how food retailers within the UK disclose food origin but are not required to disclose flower origin. All of this to say, consumers are deeply unaware of the flower products that they are

consuming feeds into the self-reinforcing loop requiring high use of pesticides and CO₂ emissions from transport and input use.

2 Introduction

Freshly-cut² flowers are widely recognised as natural, short-lived commodities with emotional significance, frequently used to express celebration or care. Unlike retail goods such as food or clothing, flowers are seldom directly associated with sustainability issues at the point of purchase. Yet behind their beauty lies a complex supply chain imposing significant environmental and social costs.

In the UK, domestically grown cut flowers represent only a small fraction of the market, with the vast majority imported through intricate international supply chains (Savills, 2025). Whilst the UK cut flower market is valued at approximately £2.2 billion, only around 10% of flowers sold domestically are grown locally (FloralDaily 2025). Thus, the beautiful array of flowers that grace supermarket shelves for only a short time are highly globalised products. This phenomenon raises a core challenge for sustainability: why do products perceived as harmless and “close to nature” continue to rely on production practices involving significant environmental and social costs, with consumers rarely questioning this at the point of purchase? Accordingly, this project focuses on the UK cut-flower market.

At first glance, the sustainability challenges facing the cut flower industry appear fragmented. They span international long-distance transport, the use of natural resources, labour conditions, and harm from chemical products (Bek et.al.2023). However, these issues do not exist in isolation: they are interconnected through the mechanisms of market organisation.

Within the current consumption economy, retail systems are crucial for converting production practices into everyday consumer behaviour. Retailers reshape the definition of ‘cut flowers’ through pricing, visual presentation and marketing, thereby influencing production decisions to meet these expectations. In the UK, supermarkets dominate national floricultural retail, controlling approximately £1.4 billion of the market (Wickedleeks 2024). Consequently,

² Synonyms are ‘cut flowers’ and ‘fresh flowers’, used interchangeably in this paper.

supermarket sites should serve as intermediary points for resolving sustainability challenges for both cut-flower consumers and producers. However, most influence over sustainability is lost beyond the point of purchase.

Our own field observations in British supermarkets further confirm this structural disconnect. First, sustainability-related information—such as country of origin, pesticide usage, or seasonality—is almost entirely absent from floral product labelling. Second, even when origin labels such as 'locally grown' appear, they primarily function as vague quality signals rather than explaining sustainable production differences. As the primary consumption venue for flowers, supermarkets emphasise their role as aesthetic and emotional commodities through price, colour, and occasion-specific offerings, rather than as agricultural products bearing a range of costs. These observations suggest supermarket floral displays actively reshape consumer understanding. Sustainability is not merely overlooked; it is rendered invisible by the retail installation itself.

Identifying the intervention point

Considering the sustainability issue in the cut flower industry systemically, a fundamental question arises: where should interventions be focused to achieve substantial change? This industry faces several significant sustainability challenges, such as carbon emissions from long-distance transport and packaging, intensive water and electricity consumption in greenhouses, poor working conditions, and pesticide use (Alig & Frischknecht 2018; Lan et al.2022; Cola et al.2020). However, these issues function differently from each other within the system and diverge in transformation potential.

To identify a realistic intervention point, this project evaluated possible responses to the cut-flower sustainability problem across three criteria (Figure 1): feasibility of change, capacity for intervention in everyday mechanisms, and urgency of the impact on the environment and people. One potential approach is to reduce the quantity of imported flowers and decrease carbon emissions associated with transport. Although this has a significant environmental impact in theory, its implementation is difficult in practice. The UK flower market is heavily dependent on imports, and domestic production capacity cannot quickly replace imported supplies. Doing so would cause significant disruption to the existing supply chain.

The second approach entails focusing on consumers. Promoting seasonal flowers reduces pressure on production, but changing cultivation methods and habits takes time. Similarly, long-term awareness campaigns can help to change expectations, but providing information alone is not enough to invite lasting changes in purchasing behaviour in supermarkets.

This comparison clearly demonstrates that reducing farmers' reliance on chemical pesticides is the most effective means to address the 'pesticide problem' within the scope of this project. This relates to worker health and environmental risks, lying at the intersection of retail quality standards and consumer expectations. Pesticides are directly linked to environmental degradation and human health risks, particularly for workers in the floriculture sector (Pereira et al., 2021, see Figure 2).

Focus on	Feasibility of change	Everyday practices	Urgency
Reduce import / transport	Low	Low	Medium
Promote seasonal local flowers	Medium	Medium	Medium
Improve consumer education	Medium	Medium	Medium
Reduce pesticide use	High	High	High

Figure 1 (By authors)

However, reducing pesticide use in flower cultivation without meeting consumer expectations may result in farmers bearing the costs, while interventions focused only on consumers may leave production practices unchanged. Consequently, addressing consumer preferences is also important, creating awareness and aesthetic sensibility encouraging individuals to make

more sustainable choices. Therefore, a two-pronged approach is essential to reduce pesticide use in both the cultivation and consumption of flowers, to be explored in this paper.

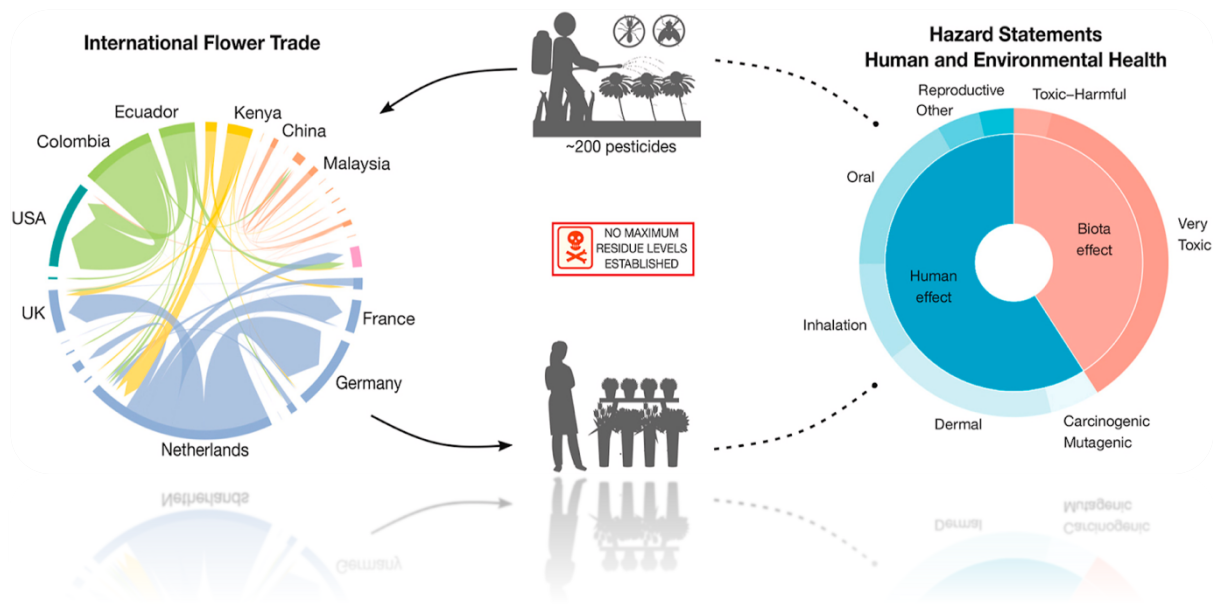


Figure 2: Pathways linking pesticide use to environmental degradation and worker health risks in floriculture (adapted from Pereira et al., 2021)

3 Stakeholder Analysis

The issue of pesticide use cannot be resolved by a single entity. Resorting to chemical pesticides is influenced by various factors, conventional farming practices, retailer sourcing standards, national and international legislation, and consumer aesthetic expectations. The following section explores the global flower supply chain, identifying the main stakeholders with interest and capacity to implement appropriate measures.

The UK flower market is embedded within a global supply chain, here examined from the British perspective (Figure 3; see Appendix 7.1 for extended version). As detailed below, the key stakeholders to be addressed in this paper are: British farmers using pesticides, DEFRA, small-scale British farmers, Flowers From The Farm (FFTF), supermarkets and individual consumers.

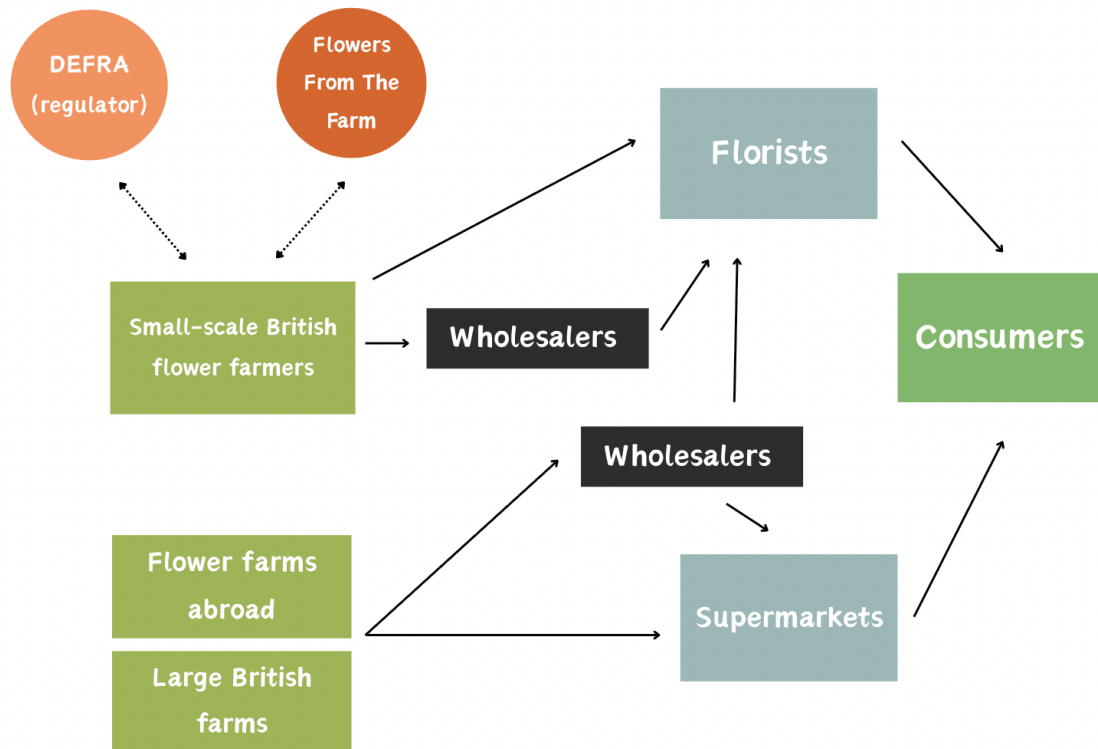


Figure 3 (By authors)

Considering flower producers, three main stakeholder groups are involved: small-scale British farmers who already grow flowers sustainably³; large British farms which typically use chemicals to speed up production or cultivate unseasonal blooms in greenhouses; and farms abroad, mainly in Kenya, Ethiopia, Columbia and Ecuador⁴ (Bullock 2025). Due to warmer climate and looser regulations regarding pesticide use, these equatorial countries can grow significantly larger flower quantities. Wishing to address the UK flower market, we are focusing exclusively on British farmers in this paper. Following the aim of reducing the cultivation and consumption of pesticide-treated flowers, working with larger British farms which utilise chemicals is crucial.

Small-scale British farmers usually sell flowers either directly to consumers (at the farm door or via subscription), florists, or wholesalers who supply florists. Here, wholesalers could also

³ The term 'sustainable' will be used hereafter to entail 'seasonal, local, regenerative, and pesticide-free'

⁴ While acknowledging that these categories of farmers are not exhaustive, for analysis purposes we simplified them into three main groups.

be small farmers, gathering specific flower varieties to satisfy customer requests (FFTF, private communication). As small farmers already grow flowers using sustainable methods, supporting their craft is important to increase consumer exposure to, and support of, sustainably-grown flowers.

Akin to small farmers, large farms also supply florists via wholesalers, and due to large production capacity, they can offer lucrative price-per-stem to UK supermarkets. Therefore, often (but not always) supermarkets prefer to source their flowers directly from large farms, bypassing the wholesaler for cost-cutting purposes. Hence, consumers can access chemically-enhanced flowers mainly through florists or supermarkets⁵ Today, supermarkets are the largest flower sales channel in the UK (circa 56%), with florists comprising only 25% (NFU 2016), working with supermarkets to increase availability of sustainable flowers allows to address the bulk of the market.

Regarding flower purchases, we identified that both individuals and businesses (like hotels, restaurants or beauty salons) are potential flower consumers. In this project, we are focusing on individual consumers because these tend to be more price-sensitive, but equally prone to making value-based choices such as supporting local community (Curtis&Stock 2023), which can be influenced towards more sustainable consumption patterns. Following Meadows (1999), shifting 'values' is one of the most powerful ways to change behaviour.

Finally, two institutions directly interact with the above stakeholders. DEFRA is the government body responsible for "improving and protecting" Britain's "environment", including designing the agricultural and horticultural policy (GOV.UK 2026). As policymakers, DEFRA have power to change regulations regarding pesticide use in floriculture, and direct funding towards re-educating farmers in more sustainable pest-control methods. Since our project aims to address the pesticide problem, facilitating the interaction between DEFRA and pesticide-using British farms is key.

⁵ Aside from supermarkets, retailers include farm shops, flower stands, farmers markets and similar. We excluded these from our analysis for simplicity, 'supermarkets' being a more important stakeholder.

Secondly, FFTF is a British trade association for small flower farmers following sustainable practices, “promoting a financially and environmentally sustainable local cut flower industry” (FFTF 2026). The FFTF has over 1000 members, connecting consumers with sustainable farmers near them via their “find flowers” online tool (Ibid). As an association, FFTF supports interests of sustainable farmers whose efforts this project aims to support, and has some negotiating power due to substantive membership, existing communication with DEFRA, and an agenda to make British floriculture more sustainable. Therefore, FFTF is a key stakeholder for our project, and a stronger partnership between FFTF, small farmers and supermarkets will be the focus of our interventions.

4 Solutions

4.1 Farmers

4.1.1 Pesticides

Pesticides are widely used chemical tools which protect crops from damage or disease borne from insects, pests and fungi; thereby, pesticides help promote crop yields (Kaur 2024). Due to their high chemical content which can harm the human body, pesticides must be handled with extreme care. For example, according to Pesticide Action Network, a widely-used pesticide *Glyphosate* is linked with causing serious diseases, including “a variety of cancers” (Pesticide 2025). Hence, farmers are typically instructed to use Personal Protective Equipment (PPE) when handling pesticides. Additionally, pesticides harm flora and fauna, negatively impacting surrounding environments including water systems and soil quality (Taylor 2025).

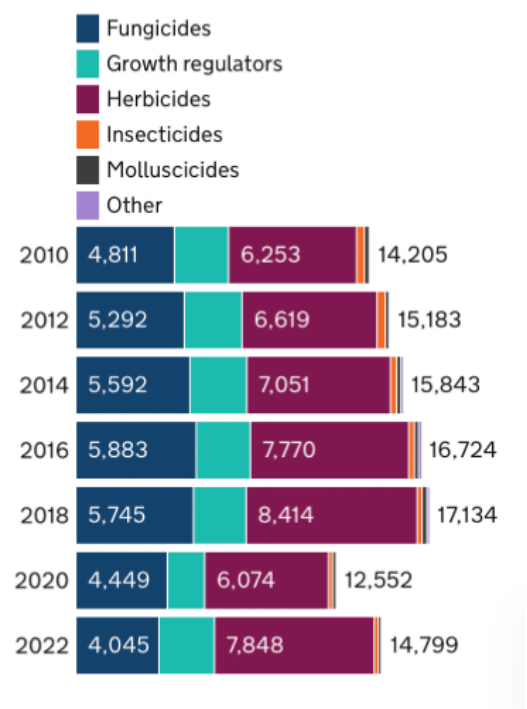


Figure 4 (Fera 2024): Dataset providing the number of pesticides and other chemical agents (in tonnes) used on arable crops in the UK between 2012-2022.

Nevertheless, in 2024 in the UK “Glyphosate was... the principal active substance used by weight applied, accounting for 2,260 tonnes of active substance and 35% of the herbicide by

weight applied” (Fera 2024).⁶ In fact, approximately 85-90% of arable crops (which include floriculture) were cultivated with pesticide treatment in the country (Department 2025). As Figure 4 shows, awareness of damage caused by Glyphosate and other pesticides alone has not deterred their usage in the arable crop industry.

Moreover, Triconazole and Acetamiprid (Fera 2024), popular insecticides, are used to treat the entire flower from petal to root; similarly to glyphosate, these chemicals are extremely dangerous to the human body. Acute exposure can induce severe lactic acidosis, as well as acute liver and myocardial injuries. Equally, low exposure over time (typically experienced by farmers and florists), would gradually build up lactic acid levels in the body, causing the same problems (Pravinson 2021). Moreover, another common pesticide in arable farming, Deltamethrin⁷, can cause neurological and gastrointestinal symptoms following acute or prolonged exposure (Johnson 2010).

In the UK, legal handling of pesticides requires a license. While the license-seeker must undergo extensive training, many still find themselves on the worse end of pesticide effect (TKF 2015). In a study done by the National Center for Biotechnology Information, British farmers who were certified pesticide users found that they may have an increase in non-melanoma skin cancer, testicular cancer, and multiple myeloma (Frost 2011). Although this study did not explicitly state the specific pesticide at fault, it highlights how damaging pesticides can be.

4.1.2 Intervention Design

Activity Theory (AT)

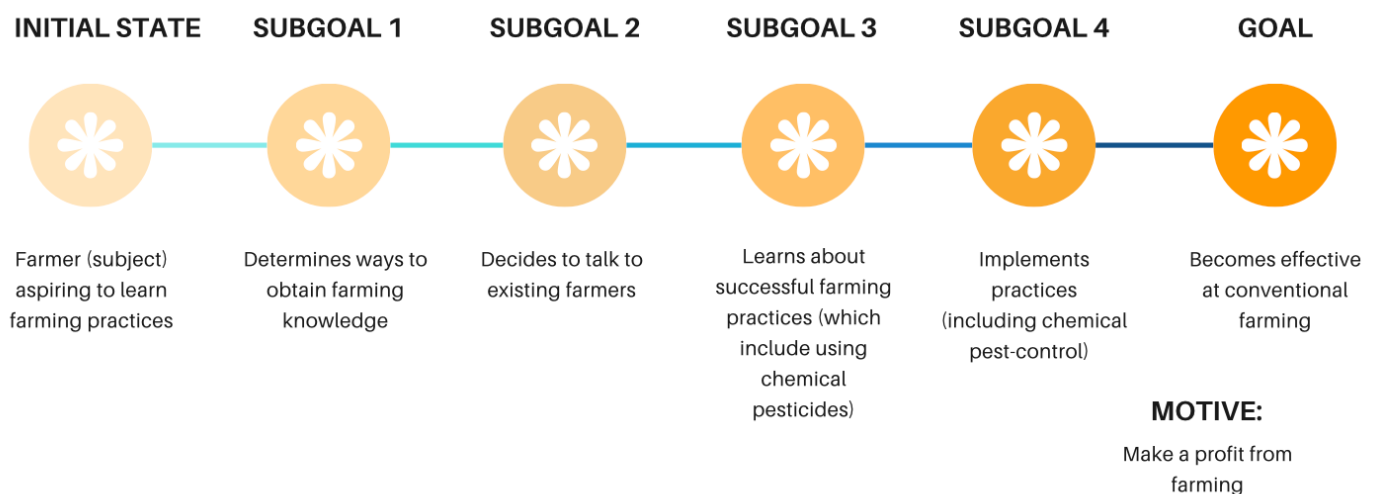
Prior to designing interventions to decrease pesticide use, we applied Activity Theory to understand farmers' behaviour in the field. AT (Lahlou 2017) is a socio-psychological framework that analyzes human behaviour within a specific context. Considering farming as an ‘activity’, we identified two distinct yet interconnected stages (Figure 5): education of

⁶ As per our calculations, the overall weight of pesticides used in 2024 equates to three adult male elephants.

⁷ Fast-acting stomach and contact insecticide

farmers on chemical pesticide use (stage 1), and the broader activity of farming with pesticides (stage 2). At Stage 2, despite the clear motive and goal, the farmer resorts to removing weeds or pests using chemical pesticides due to factors like formal agri-education, generational farming knowledge, and a limited awareness of less harmful alternatives. However, if one were to intervene when knowledge is being transferred to the farmer, and provide better alternatives to pesticides, the farmer would achieve the same goal without risking their health. Simply put, to shift the farmers' behaviour towards applying more sustainable pest-control methods, the intervention must therefore happen at the education level.

Stage 1: Education



Stage 2: Farming

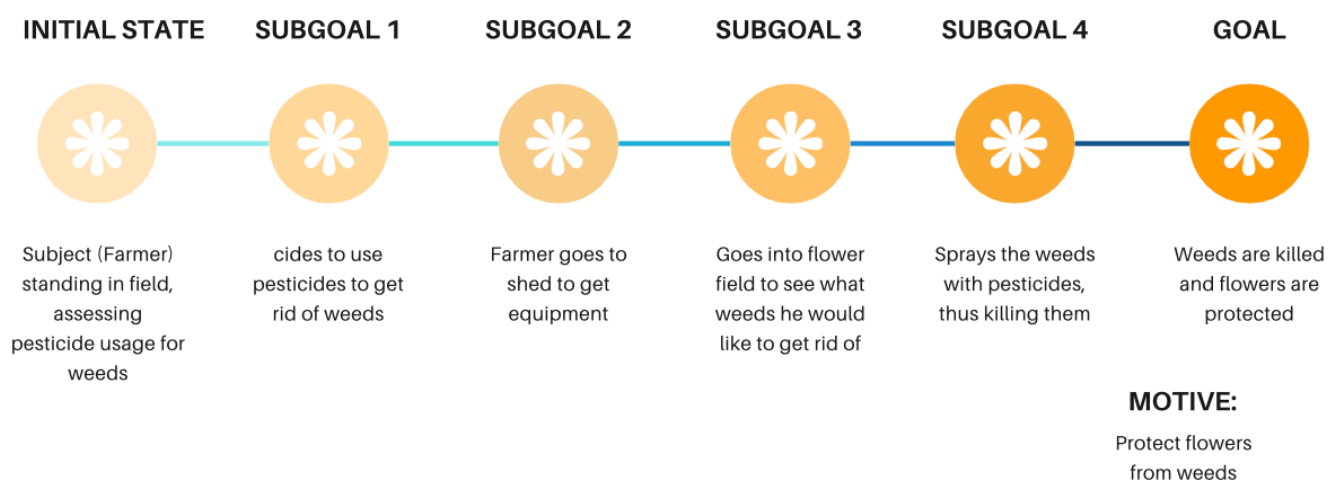


Figure 5 (By authors)

Installation Theory (IT)

Following Lahlou's (2017) Installation Theory, situations can be deconstructed into three layers (physical, embodied competencies, and social regulation) to help develop targeted interventions which can alter participants' behaviour. Provided that every layer of the installation is addressed, it becomes robust and self-sustaining because even if one layer fails, the other two would support the behaviour encouraged by the intervention (Ibid).

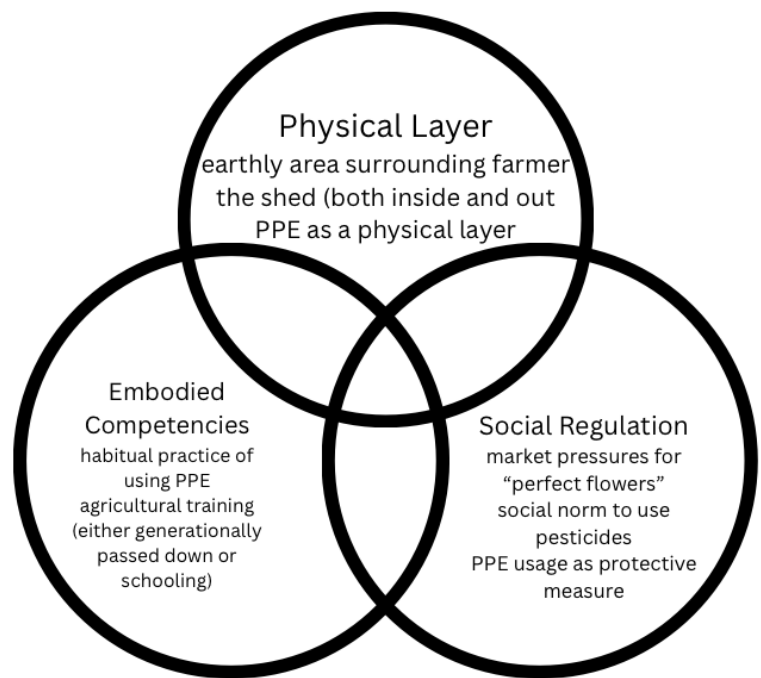


Figure 6 (By authors)

Hence, the installation of 'farmer in the field' can be understood as three layers (Figure 6). Firstly, the farmer's physical environment, including the earth, shed and PPE protection, as well as the pesticide itself, all comprise the physical layer. Secondly, the farmer's embodied competencies include their agricultural training, received through formal schooling or informally from previous generations in the family. Finally, the social regulations constraining the farmer are market pressures to cultivate 'perfect flowers' which are available year-round; the standard for using chemical pesticides in the UK, and PPE protection to mitigate health risks.

Considering AT and IT, the following interventions were designed to promote the reduction of pesticide use among British farmers who currently use them (as opposed to small-scale sustainable farmers, as defined in section 3), and switch to non-harmful alternatives.

4.1.3 Interventions

The following three interventions were designed after identifying two pain points of the farmers in the above installation. Firstly, data suggests that British farmers currently have

limited knowledge regarding available alternatives to chemical pesticides. To address this issue, we propose working with DEFRA to train farmers specifically on chemical-free pest-control methods. Out of the suitable methods, we advise to use a hot foaming tool 'Foamstream', which "kills weeds, moss and algae using a combination of near boiling water covered by a biodegradable foam. The foam acts as a thermal blanket, ensuring the heat is retained in the water while it's applied to the plant, keeping the plant in the kill zone for 6 times longer than any other herbicide-free alternative" (Powys 2022). This alternative is suitable for flowers because it does not damage plants and is not harmful for farmers.⁸

Secondly, there is a lack of government support for British flower farmers today, including policies such as subsidies for flower growth or agricultural education. Following Taylor (Taylor 2025), the British government has neglected British flower farmers in favor of supporting imports, likewise, local flower farmers are being out-priced by competing growers abroad, therefore retailers are more inclined to purchase imported flowers. Therefore, the UK government could do more in supporting the local flower farmers, learning from industry leaders like the Netherlands (NFU 2016). To address this issue, we propose introducing subsidies for British flower farmers to alleviate costs, as well as investing in education for pesticides alternatives proposed above.

Finally, cultivating flowers seasonally and locally will naturally limit the number of pesticides used in the process (Bullock 2025). However, this aspect will only succeed if consumers have access to and interest in buying local and seasonal stems.

4.2 Consumers

To boost consumer demand for chemical pesticide-free and seasonally-grown stems, it is crucial to shift consumer preferences towards choosing sustainable flowers over non-sustainable alternatives (while improving farming practices).

⁸ Hand weeding and high-pressure water systems (pressure washers) are also excellent alternatives. But, due to costs of labour for increased weeding time, they might not be feasible for large farms given the low horticulture funding in the UK. Pressure washers are also very harsh, making them less suitable for flower farming.

Since shifting farmers' pest-control behaviours will take time, we propose to work with small-scale British farmers who already follow sustainable growing principles and aim to increase their sales to consumers. Through exposure, raising awareness, meaning-making and design, we hope to cultivate value and habit-driven preferences among consumers to choose sustainable bouquets for every occasion.

According to National Farmers Union (2016), around 56% flower sales in the UK happen at supermarkets, with florists being the second dominant sales channel (25%). Another study of global flower shopping trends supports this conclusion (IFPA n.d.). With supermarkets dominating the retail environment, to address the bulk of the market we propose a partnership between small-scale British farmers of the FFTF network and one supermarket chain. This will entail a trial run of offering sustainable bouquets at shops within the chain according to principles outlined below.

Figure 7 shows the key stakeholders involved in this intervention.

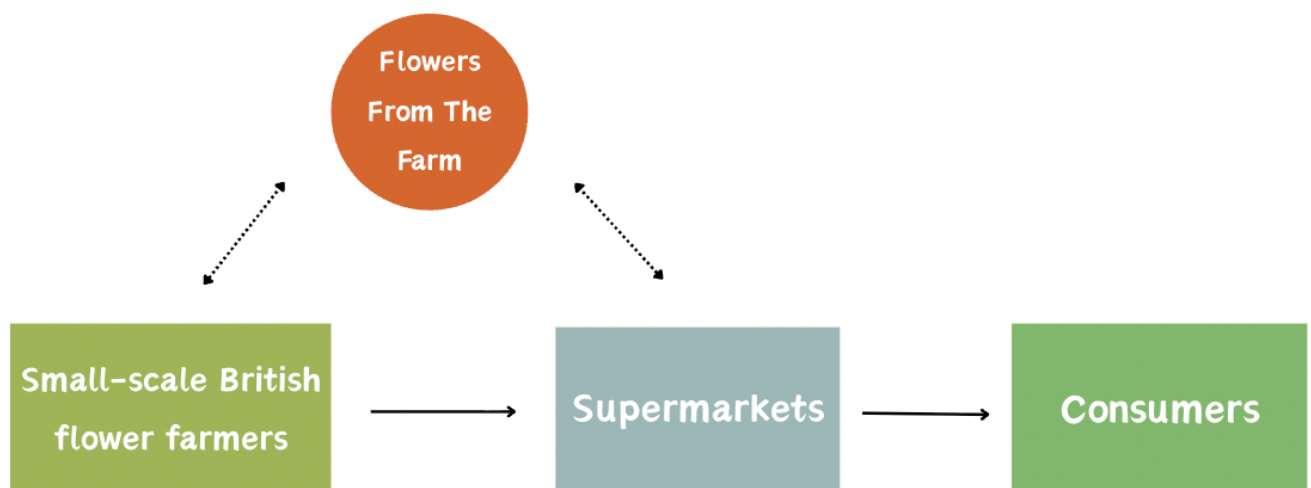


Figure 7 (By authors).

4.2.1 Understanding consumers

The use of pesticides in the cut-flower industry is influenced not only by suppliers but also by the retail environment and consumer expectations. In British supermarkets, floral purchases are integrated into routine grocery shopping. Research indicates that many floral purchases are not planned, but triggered by in-store prompts and product displays (Rombach et al. 2021).

To support consumer-facing intervention design, we identified three distinct consumers ‘personas’ who purchase supermarket flowers. These personas are not specific to demographic segments, but rather reflect different decision-making logics when purchasing flowers, particularly concerning freshness, price sensitivity, and time constraints. These personas are reflected in the survey-based segmentation of British floral consumers (IFPA 2024; see Figure 8).

Persona	Core buying logic	What they notice	What they ignore	Sustainability blind spot	Leverage for intervention
Impulse Healers	Emotional self-reward; impulse	Freshness, colour, price	Production methods; pesticide use	Short decision window; sustainability not salient	Frame low pesticide as “naturally fresh”
Convenient Household Shopper	Efficiency; value for money	Vase of life, reliability, price	Abstract sustainability labels	Sustainability seen as “extra cost”	Link pesticide reduction to durability
Rational Middle-aged Male	Cost–performance calculation	Price, longevity	Ethical narratives	Low emotional engagement	Emphasise functional benefits

Figure 8 – Supermarket Consumer Personas, made by authors based on IFPA (2024) research.

4.2.2 Solution for *Impulse Healers*

Impulse Healers represent a segment of supermarket shoppers who purchase flowers opportunistically during routine errands (Figure 8). Their decisions are shaped by demanding work schedules, limited decision-making bandwidth and emotional exhaustion, leading them to prioritise quick, affect-driven rewards over deliberative evaluation. Hence, their flower purchases are forms of self-care and mood regulation. Research on supermarket flower consumption shows that nearly half of flower purchases are made “for no particular reason” and are driven by convenience, freshness and price rather than caring about sustainability (IFPA 2024; Progressivegrocer 2025).

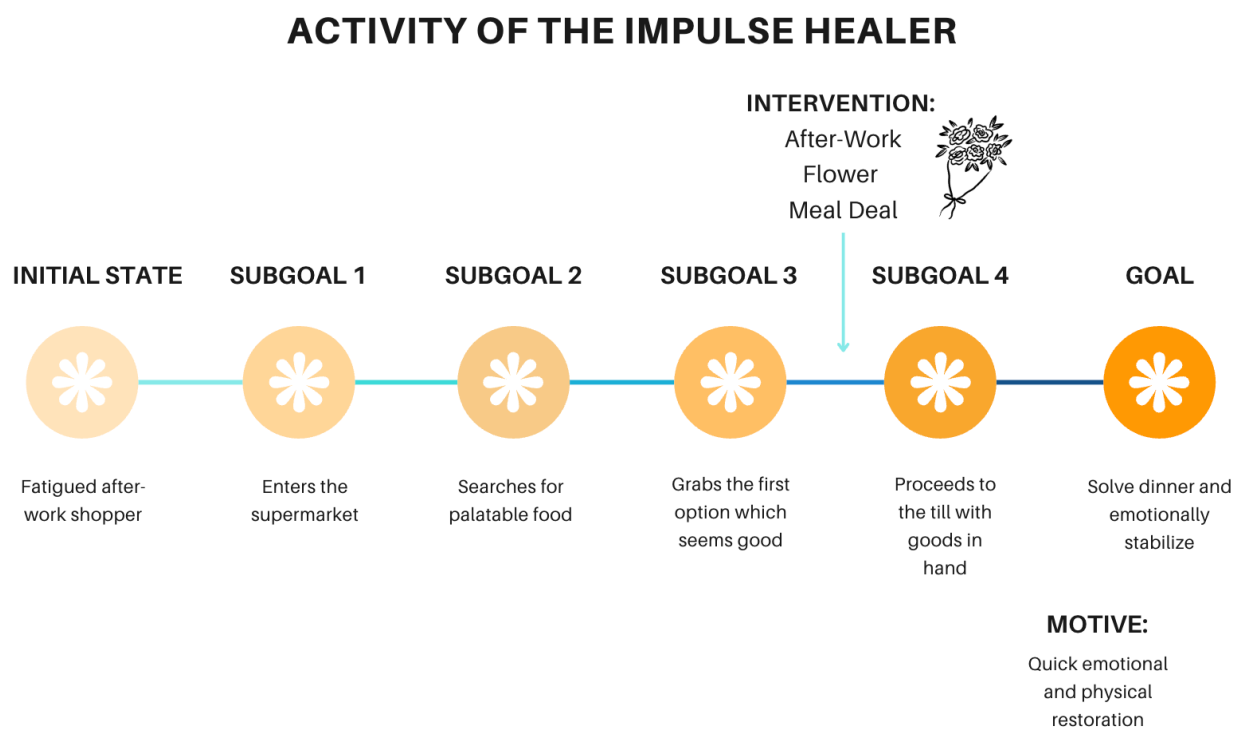


Figure 9 (By authors)

From an AT perspective, the activity system of the Impulse Healer is centred on evening recovery (Figure 9). The subject is the fatigued after-work shopper, whose motive is quick emotional and physical restoration. The goal is to solve dinner and emotional relaxation simultaneously, within a constrained time frame (Lahlou 2017). In this system, flowers typically become “optional object[s]” requiring extra effort and decision-making. This separation limits uptake, especially for sustainable flowers that may be perceived as more expensive or effortful.

Lahlou's (2017) IT helps explain why ethical flower choices rarely happen in this context. The physical installation of supermarkets places flowers in dedicated floral zones, away from food and evening meal decisions. Embodied habits frame flowers as gifts or special treats rather than everyday recovery tools. Socially, flowers are not strongly associated with after-work routines. This means that even consumers who value wellbeing or sustainability do not reliably act on these values during routine shopping.

Intervention: Flowers as part of "After-Work Meal Solutions"

The proposed intervention integrates sustainable British flowers directly into 'After-Work Meal Solutions' by bundling them with ready meals, wine or dessert in a dedicated supermarket section. Rather than being sold as a standalone product, flowers become part of an evening recovery bundle. This reframes flowers from an 'optional extra' into an element of everyday decompression.

In AT terms, the motive of the activity shifts. Flowers are no longer an independent purchase, but integral part of the evening routine that addresses emotional and physical needs. The action of buying dinner automatically includes the possibility of buying flowers, reducing cognitive barriers (Lahlou 2017). Over time, repeated exposure builds a stable activity pattern (Wood&Rünger 2016) in which flowers are consistently associated with winding down after work.

From the IT perspective, physically placing flowers next to ready meals, wine and desserts, with a unified visual design, presents them as part of a single solution rather than a separate choice. The customer's embodied experience is reshaped by repeatedly associating flowers with comfort and integrating them into a routine, low-effort action. Socially, the intervention not only requires coordination between food and flower departments and prioritises local supply chains, but also establishes a recognisable 'flower meal deal' that circulates through everyday social interaction. With shoppers noticing and adopting this bundled practice, informal discussion allows knowledge of the 'flower meal deal' to spread within the community, reinforcing it as a socially validated routine.

Cialdini (2009) describes six core principles that explain why people tend to say “yes” (see Appendix 7.3 for an overview). The proposed intervention is designed with Cialdini’s principles of influence in mind, recognising that supermarket decisions are often made quickly and with limited cognitive effort. By embedding these principles into the shopping environment, the intervention supports sustainable flower choices through low-effort, routine-based decision-making.

This intervention draws on all six principles of influence (Ibid), which are applied as follows: Bundling activates ‘reciprocation’, as flowers are framed as added value rather than an upsell. Repeated pairing of flowers with after-work meals and point cards creates ‘commitment and consistency’, gradually normalising this combination and supporting habit formation without requiring conscious ethical reflection (Cialdini 2009). ‘Social proof’ is introduced through cues and signs (e.g. ‘most chosen bundle’) because when consumers are cognitively depleted, information about other people’s choices can be a powerful decision-making shortcut (Polman & Vohs 2016). ‘Liking’ is addressed through empathetic language that acknowledges everyday exhaustion, while ‘authority’ is conveyed through florist-curated combinations that legitimise the choice without demanding detailed evaluation. Finally, ‘scarcity’ is embedded through weekly changing bundles aligned with seasonal availability, increasing perceived value and urgency (Cialdini 2009).

By embedding sustainable British flowers into an existing routine that already fits the Impulse Healer’s needs, the intervention reduces reliance on imported, pesticide-treated flowers without requiring explicit ethical motivation.

4.2.3 Solution for *Convenient Household Shoppers*

Convenient Household Shoppers are supermarket flower buyers who approach purchases with a strong focus on practicality and efficiency (Figure 8). Their decisions are guided by value for money and functional outcomes, with particular attention to flowers’ ‘vase life’, while broader sustainability claims are often overlooked if they appear abstract or add perceived cost (IFPA 2024; Haviland-Jones et. al.2005; Progressivegrocer 2025).

From an AT perspective, the subject is the household manager, whose motive is to maintain a safe yet aesthetically-pleasing home environment. The goal is to make sensible, low-risk

purchasing decisions aligned with family needs, particularly in households with children or pets, (Figure 10). Within this activity system, flowers function as decorative objects that contribute to domestic wellbeing.

ACTIVITY OF THE HOUSEHOLD SHOPPER

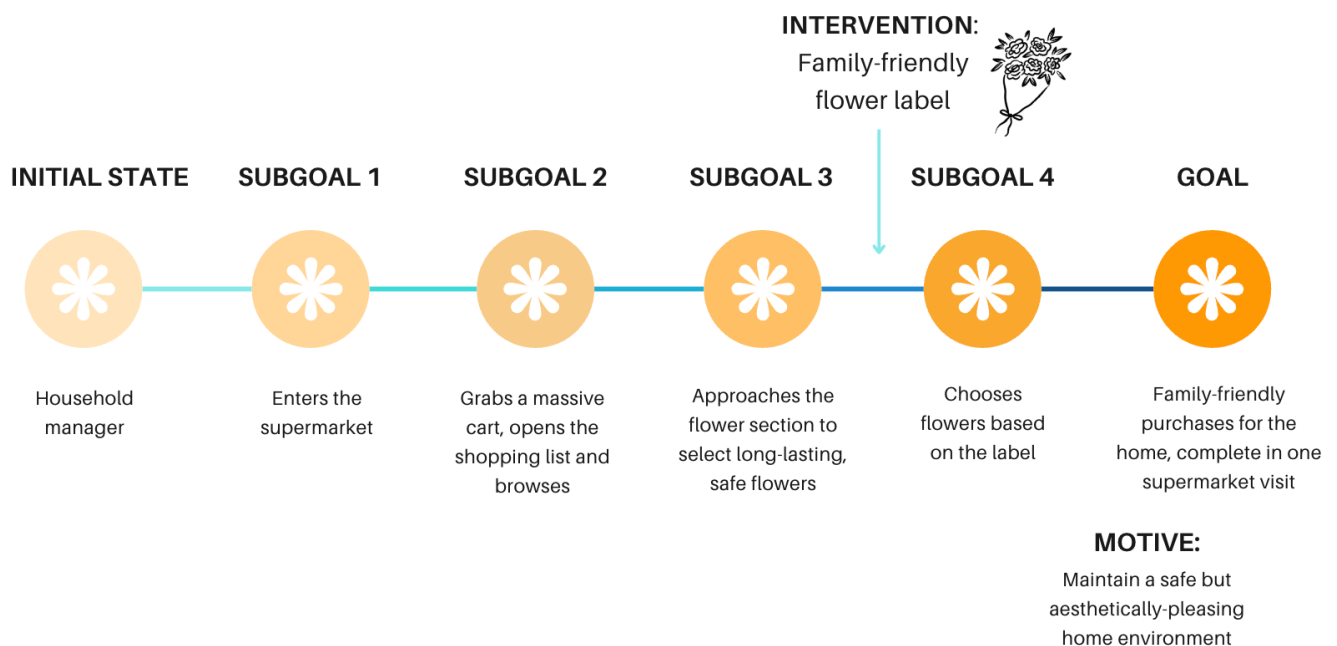


Figure 10 (By authors)

Additionally, IT (Lahlou 2017) helps explain why sustainable or low-pesticide flowers are not consistently chosen despite underlying concern for health. Physically, relevant information about production methods is often missing or difficult to interpret at the point of sale. Embodied shopping habits prioritise speed and familiarity, leaving little cognitive space for processing abstract sustainability labels. Socially, flowers are rarely framed as products subject to safety standards comparable to food, which creates friction and discourages careful selection.

Intervention: Family-Friendly Flower Label

To address Convenient Household Shoppers, we designed a clear and simple “family-friendly” flower label, highlighting reduced chemical use, suitability for homes with children or pets and seasonal British origin (Figure 11). Rather than appealing to abstract environmental values,

the label directly addresses household concerns around safety and care. Minimal, easily processed information allows shoppers to make confident decisions quickly (Wood & R nger 2016).



Figure 11: Family-Friendly Label (By authors)

Within AT, the intervention aligns the object of flower purchasing with the household manager's motive. Flowers are reframed as safe domestic products that support home aesthetics without compromising family wellbeing.

From the IT perspective, the intervention operates across physical, embodied, and social layers by making safety information visible, transforming sustainability into a felt sense of care, and embedding trust through institutional standards rather than individual effort. See appendix 7.2 for more detail on how these constraints manifest across the different layers.

Cialdini's principles help explain why this intervention is effective in routine shopping contexts. 'Liking' can be activated by using a relatable spokesperson who reflects the identity and everyday realities of the target persona. For example, a UK-based family influencer in their mid to late 30s could promote sustainable, family-friendly flowers through online content that

situates the product within familiar domestic routines. By presenting the flowers in a context that feels authentic, the message benefits from perceived relatability and emotional connection, increasing persuasion without relying on explicit sustainability arguments. See appendix 7.2. for more detail on how Cialdini’s principles are applied in this intervention.

4.2.4 Solution for *Rational Middle-aged Males*

Rational Middle-aged Males represent a highly utilitarian segment whose flower purchases are driven by deliberate cost-performance evaluation (Figure 8). They concentrate on price and longevity as the primary value indicators, and tend to disengage from emotionally framed or ethical messaging, responding instead to functional benefits (Gillespie 2025; Progressivegrocer 2025; IFPA 2024).

From an AT perspective, the subject is a rational buyer, motivated by avoiding social risk and unnecessary spending. The goal is to make a safe, appropriate choice quickly, without extended comparison or aesthetic judgement. Within this activity system, flowers function as tools for social compliance rather than expressive objects. The object of the activity is therefore flowers as functional gifts that reliably meet social norms (Figure 12).

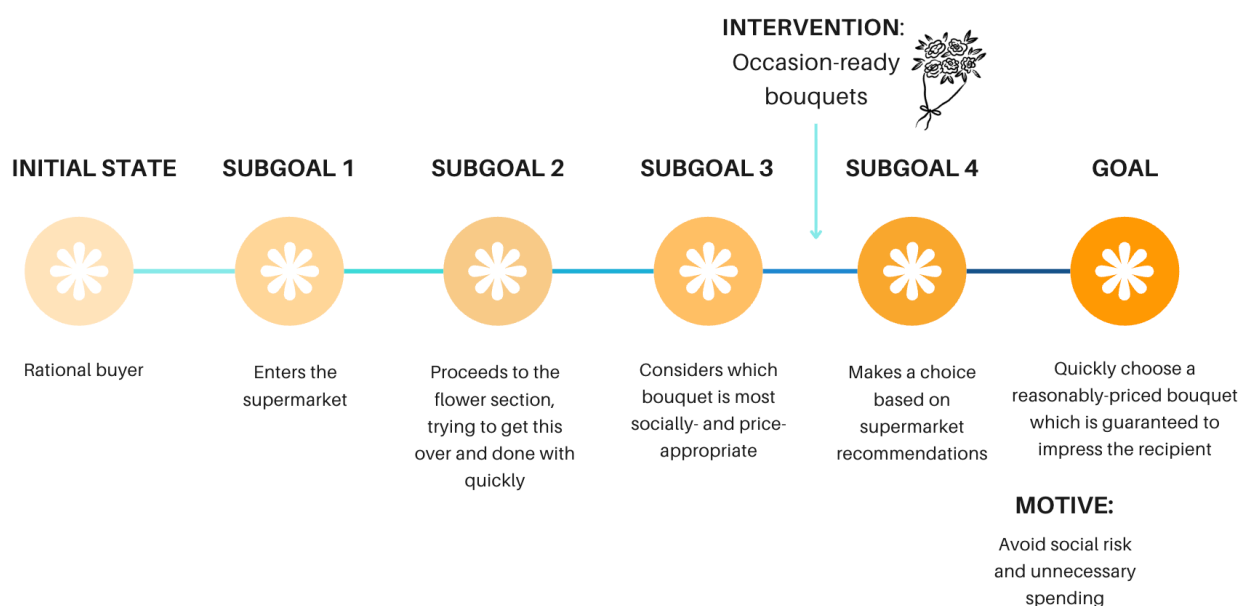


Figure 12 (By author)

The IT explains why sustainable or British flowers are rarely prioritised by this persona. Physically, flower displays often require interpretation and comparison, which increases perceived risk of making the ‘wrong’ choice. Embodied habits emphasise caution, price comparison, and regret avoidance. Socially, sustainability lacks a clear translation into rational value, making it peripheral to the decision-making process.

Intervention: Occasion-Ready British Bouquets

The proposed intervention introduces pre-labelled, occasion-ready bouquets designed for specific contexts such as Mother’s Day, anniversaries, or visits. These bouquets are fixed-price, clearly labelled and sustainably sourced from British growers. By explicitly matching flowers to social situations, this intervention removes ambiguity and positions the bouquet as a ‘safe’ and ‘correct’ choice.

Within AT, this intervention directly supports the subject’s motive and goal by reducing decision effort while ensuring social appropriateness. Flowers are stabilised as functional tools that reliably solve a social task rather than discretionary purchases.

Through IT, the intervention reshapes the decision environment across all layers. Physically, clear labelling and fixed pricing reduce cognitive load. Embodied experience reframes sustainability as risk reduction rather than moral virtue. Socially, seasonal planning and stable supplier contracts embed sustainability into predictable retail structures.

Cialdini’s principles further explain why this intervention aligns with the Rational Middle-aged Male’s decision style. For example, ‘authority’ is activated by presenting the bouquet as the outcome of a predefined decision. Labelling such as ‘Mother’s Day Standard Bouquet’ or ‘Anniversary Selection’ signals that the choice follows an established convention. Furthermore, scarcity is embedded through occasion-specific availability, where bouquets are only offered within a narrow temporal window tied to a particular event. This framing positions the product as appropriate only now, reinforcing timeliness rather than impulse urgency. See appendix 7.2. for an overview of Cialdini’s principle applications.

Overall, these solutions reposition sustainable British flowers as rational, low-risk choices by aligning sustainability with efficiency and social appropriateness. However, FFTF (2026, private communication) notes that supermarkets have historically been reluctant to source from small-scale growers due to higher costs compared with larger, less sustainable suppliers. For successful implementation, supermarkets must therefore also be persuaded that introducing a higher-priced sustainable flower range can be financially viable. While further cost modelling is required to determine the lowest feasible price point, we propose framing the intervention as a partnership that supports local communities and environmental goals while strengthening the retailer's environmentally minded customer base. Following Lahlou (2026), price-sensitive stakeholders are best convinced by real-life examples of 'what works', so proposing a supermarket trial is a viable step towards creating a more permanent partnership.

5 Discussion

This paper explored sustainability challenges in the UK cut flower industry as a system that links pressure on production and day-to-day consumption in supermarkets. Although this industry faces various environmental and social problems, dependence on pesticides is seen as the most effective leverage to change the system. This is based on the urgency for human health and the environment, feasibility, and the interrelationship between agricultural practices and retail expectations.

The first part of our solution does not aim to completely eliminate pesticide use on farms, but rather introduces less harmful alternatives and training, with a goal of gradual transition. However, changing farming practices alone will not be effective unless consumer preferences and choices shift towards more sustainable flower options. Since reducing the amount of pesticide-treated cultivation will take time to implement, a consumer-focused intervention was proposed to simultaneously boost demand for sustainable flowers, signaling to producers to match it.

Solving the problem one-sidedly would expose farmers to market risks or place responsibility on consumers. The dual strategy, combining support for farmers with consumer interventions in supermarkets, is therefore more effective as it helps harmonize the system's opposing forces and expectations. Following IT (Lahlou 2017), behavioural change is easier to achieve

when the physical environment, daily habits and shared meanings are addressed collaboratively, rather than simply through the dissemination of information. Finally, this approach is consistent with the UK's National Pesticide Action Plan (DEFRA 2025), which aims to reduce pesticide risks through concerted action across production and consumption environments.

6 Limitations

One limitation of the farmer-focused intervention, results will take time to show effect, requiring trust, patience and funding to support its implementation. Crucially, re-educating farmers on chemical-free pesticide alternative use requires government funding for training and materials, while horticulture spending has been scarce in the UK for the past decades (Beck et.al. 2023). However, supplementing the proposal with testimonies of farmers who rely on alternative method, together with calculations proving cost reduction, would help convince the government of the feasibility and financial long-term benefits of this solution.

Another limitation of this proposal is the scarcity of open-source market data on the UK sustainable flower market. For instance, during a call with our team, FFTF confirmed that small-scale farmers struggle to count their output value because unlike larger farms cultivating single varieties, small farmers grow many different flowers at once which differ in price, making price-per-stem difficult. This limitation required us to rely on estimated figures to understand the market.

Finally, the choice of supermarkets for the consumer-focused intervention makes our project more effective in the urban environment, where people have access to supermarkets chains. Contrarily, in rural settings and smaller towns or villages, flower-purchasing practices are likely to be different as people are physically closer to farms, including sustainable farms. This, however, presents an opportunity for future research.

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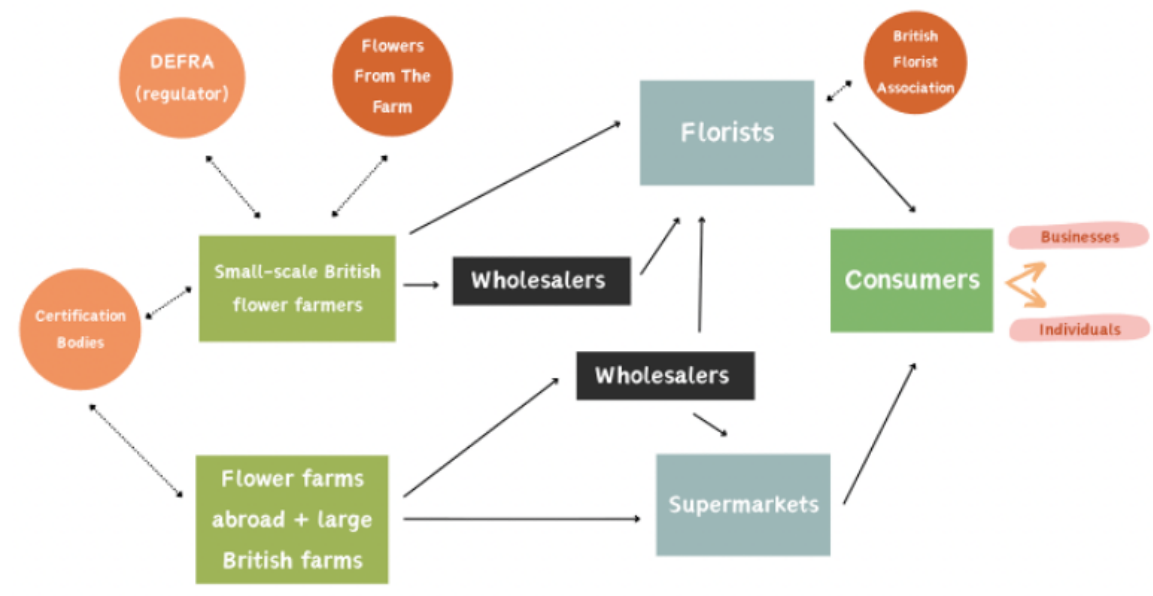
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7 Appendices

7.1 Stakeholder Map



“Stakeholder Map of the British Cut Flower industry, visualized from the UK perspective.” Created by authors.

7.2 Application of Installation Theory and Cialdini's Principles to Solutions

(Created by authors)

Three Layers of IT (Lahlou 2017)	Personas			
		Impulse Healers	Convenient Household Shoppers	Rational Middle-aged Males
	Physical Layer	- Flowers placed next to ready meals, wine, desserts - Bundled as part of an "after-work solution" - Unified visual design reduces choice effort	- Clear "family-friendly" label at point of sale - Simple icons highlighting low chemical use and UK seasonality - Minimal text for fast processing	- Occasion-ready bouquets - Fixed pricing and clear labelling - British origin made explicit
	Social Layer	- "Flower meal deal" becomes a shared shopping practice - Social proof cues such as "most chosen bundle"	- Institutional standards for reduced pesticide use - Trust through verification rather than consumer research - Social framing of flowers as safe household products	- Social norms made explicit (e.g. Mother's Day, anniversaries) - Sustainability embedded via retailer-grower contracts
Cialdini's Principles Cialdini (2009)	Embodied Layer	- Flowers associated with relief & decompression - Integrated into habitual dinner-shopping routines - Reduced cognitive effort through automatic inclusion integrated into habitual dinner-shopping routines	- Flowers associated with care, safety and protection - Reduced uncertainty supports confident, low-risk decisions - Sustainability experienced as household care rather than ethics	- Sustainability reframed as risk reduction - Emphasis on reliability, correctness & regret avoidance
	1. Reciprocation 2. Commitment/Consistency 3. Social Proof 4. Liking 5. Authority 6. Scarcity	1. Flowers presented as added value 2. Repeated meal-flower pairing 3. "Most chosen bundle" cues 4. Empathetic, everyday framing 5. Florist-curated selections 6. Weekly/seasonal bundle changes	1. Perceived retailer care through effort-reducing safety assurance label 2. Repeated "safe" choices 3. "Chosen by families" cues 4. Relatable UK family influencer endorsement 5. Expert-backed standards mentioned 6. Seasonal British flowers changes	1. Retailer pre-selects safe, effort-free option 2. Repeated use of the same "safe" bouquet 3. "Most chosen for this occasion" cue 4. Neutral, non-emotional framing 5. Standardised, rule-based bouquet selection 6. Occasion-bound, time-specific availability

7.3 Cialdini's Six Principles of Influence

Created by authors, based on Cialdini's (2009) conceptualization of the six principles of influence, the table summarises how each principle operates in everyday, low-effort decision-making contexts:

Principle	Core Explanation	Relevance to Everyday Decision-Making
Reciprocation	People feel a social obligation to return a favour or kindness they have received.	Reduces resistance by framing an action as a response to perceived generosity rather than a demand.
Commitment and Consistency	Individuals tend to act in ways that align with their prior actions or commitments, even small ones, to maintain a coherent self-image.	Encourages repeated behaviour over time, supporting habit formation through small, consistent choices.
Social Proof	People look to the behaviour of others to determine what is correct or appropriate, especially under uncertainty.	Functions as a decision shortcut when cognitive effort is limited, guiding behaviour through observation rather than evaluation.
Liking	People are more likely to comply with requests from those they like, feel similar to, or perceive as friendly and relatable.	Increases acceptance when messages resonate emotionally or align with everyday identities.
Authority	Individuals tend to defer to experts or figures perceived as knowledgeable or legitimate, even when authority is symbolic.	Provides reassurance and legitimacy, reducing the need for personal judgement or technical understanding.
Scarcity	Items perceived as limited, rare, or available for a short time are seen as more valuable and desirable.	Creates urgency and perceived value, prompting quicker decisions under time or attention constraints.

7.4 AI Usage

Item	Model	Purpose	Prompt
Bibliography	ChatGPT	Adjusting the bibliography for correct citation style (used for some sources)	"Please fix the following citations to be APA formatted."
4.1.2	ChatGPT	Improving the flow of the sentence based on original text written by author.	"Please make this sentence more coherent/flow better."