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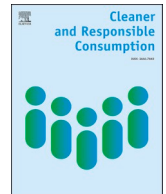
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Factors influencing consumer use of social supermarkets in the UK: A redistribution model providing low-cost surplus food

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ABSTRACT

Food poverty and food waste are prominent societal challenges in the UK. To mitigate their effects, social supermarkets (SSMs) provide high quality surplus food, usually not considered sellable in the mainstream market, to low-income consumers for substantially discounted prices. SSMs aim to supply high quality surplus food in a more dignified shopping experience and thus help lift people from food poverty while allowing customers to exercise personal choice in a supermarket setting; in many cases, they also provide ongoing support and access to additional resources. The aim of this study is to test and estimate relationships between factors that influence consumer intention to use a SSM. A conceptual model was built based on the theory of planned behaviour (TPB) and tested using cross section survey data ($N = 486$) and structural equation modelling (SEM). The model explained 64% of the variance in intention to use a SSM, with attitudes towards them as the strongest influence. Other influences were price consciousness; knowledge of SSMs, foodbanks or other forms of food assistance programmes (FAP); past experience of food insecurity; perceived risks associated with SSM use; perceptions of consumer normalcy, and perceptions of food quality and safety. This study is, to the best of our knowledge, the first to analyse consumers' perceptions of SSMs. The findings are relevant for food waste reduction policies as they indicate factors potentially influencing the use of an emerging avenue for food surplus.

1. Introduction

Global food waste has reached unprecedented levels, posing a serious inefficiency in resource use which consequently contributes to climate change and environmental deterioration. Food waste represents an opportunity cost in lost calories for those who are food insecure and in wasted resource extraction and use from farm to table (The Eat-Lancet Commission, 2019; Gustavsson et al., 2011). Waste arises from overproduction, mismanagement and inefficient behaviour in retail, hospitality, and households. European Union (EU) estimates of annual food waste is 57 million tonnes (European Commission, 2022) and total UK food waste 9.5 million tonnes, incurring a substantial financial loss as well (WRAP, 2020). Food waste management can be separated into distinct processes which exist in a hierarchy. Near the top of this hierarchy is redistribution for human consumption or as animal feed as the most desirable outcome for reducing food waste, after measures to prevent surplus in the first place (DEFRA, 2021; Papargyropoulou et al., 2014). Surplus food is food that is edible but not considered sellable in mainstream markets (Saxena and Tornaghi, 2018). This is food near or

past its 'best before' date, near its 'use by' date, food that is overstocked, mislabelled or with damaged packaging.

In the Global North, food assistance provision is diversifying as food insecurity rises and becomes a common feature of many countries (Long et al., 2020). In the UK, shifting economic policy, in particular austerity policies, and social reforms have had detrimental effects for low-income families (Bayliss et al., 2021; Lambie-Mumford and Loopstra, 2020). Since 2010, the UK has seen the largest cuts to public finances and some of the most extensive changes to social benefits in approximately 80 years (Wright et al., 2020; Loopstra et al., 2018; Beatty and Fothergill, 2013; Taylor-Gooby and Stoker, 2011). As a result, food poverty has increased and currently, across all four UK nations, between 9 and 20% of adults age 16+ are considered to be in marginal, moderate or severe food insecurity (Scottish Government, 2022a,b; Food and You, 2019). Dowler and O'Connor (2012) describe food poverty or food insecurity as "the inability to acquire or eat an adequate quality or sufficient quantity of food in socially acceptable ways (or the uncertainty of being able to do so)" (p. 44). In addition to social policy change, there are concurrent crises such as the Covid-19 pandemic and cost of living crisis where the

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rising cost of essentials such as fuel, food and housing have driven many households to seek food assistance (Goodwin, 2022). Between 2011 and 2015, the use of Trussell Trust foodbanks, the largest charitable food assistance provider in the UK, increased eight-fold (Garthwaite, 2016a). Following this, supply of three-day emergency food parcels more doubled between 2015 and 2021 (House of Commons Library, 2022).

Increasingly, food insecurity and food waste are studied together. New services are emerging as the unmet need for food shifts from being a predominantly acute issue, affecting a relatively small proportion of society, to a chronic one that is extending to those in different socio-economic groups. Foodbanks, other food assistance programmes (FAP) and food redistribution companies take surplus food from retailers, such as supermarkets, wholesalers or directly from farmers, to help people experiencing food insecurity. A 91% increase in redistributed surplus food was reported between 2018 and 2021 in the UK (WRAP, 2022a). Surplus food redistributed in the UK via charitable channels made up 61% of the total, and the volume of surplus food handled by charities has increased considerably more from 2015 to 2021 by comparison to the commercial sector (WRAP, 2022b). On this trajectory, redistributed surplus will become an increasingly larger part of the discussion on the sustainability of the UK food system. The needs that many of these services are attempting to meet are also diversifying. Food can also be seen holistically as grounded within social and material conditions that dictate an individual's access to it. One model which has emerged is the social supermarket (SSM). It aims to provide high quality redistributed surplus food to people at sizeably reduced prices (60–80%). This is mostly via a membership or means-tested model and less commonly open for anyone to use. Emphasis is on dignified provision through exchange of money and the freedom to browse and choose your items in a supermarket setting. This model can be contrasted with foodbanks. Foodbanks provide an important service for those in crisis but are characterised by generally relying on donations, not surplus, and where food is given for free with minimal or no choice (Garthwaite, 2016b; Garthwaite et al., 2015; Demos, 2015). In many SSMs additional services are offered to empower individuals and reduce their need for FAPs over time. These services may include classes on budgeting or cooking, community kitchens or cafes which foster social interaction, and signposting or drop-in sessions for specialist services, such as housing, employment, or welfare rights (Saxena and Tornaghi, 2018; Holweg and Lienbacher, 2016; Schneider et al., 2015).

SSMs aim to cater to individuals who have some form of income but are struggling to adequately feed themselves or their household, while foodbanks provide a lifeline for people during periods of acute crisis. The rationale of SSMs is provision of tailored support to individuals over longer timescales. Currently in the UK, there are considerably fewer SSMs relative to foodbanks, with the first having opened in 2013. As charitable food assistance is primarily borne of local community initiative, emergence of SSMs can be sporadic and little research has been done on this redistribution model. Previous research has almost exclusively focused on exploratory work linked to mapping and categorising the supply side of SSMs such as where they are located (Williams and Tait, 2022; Lienbacher et al., 2021; Saxena and Tornaghi, 2018), where they source food from, or staffing model (Caraher and Furey, 2018; Holweg and Lienbacher, 2016; Demos, 2015; Schneider et al., 2015) as opposed to consumer experience.

Sustainability research has looked at the SSM model from a life cycle assessment angle (Bergström et al., 2020) or when reviewing the viability of food sharing models transitioning online (Michellini et al., 2018). Knežević et al. (2021) surveyed consumers in Croatia, Poland, Lithuania and Serbia on their opinion of SSMs, what their societal mission should be and how involved the state should be in supporting them. Holweg and Lienbacher (2016) surveyed SSM users but no research, as of yet, has conducted a statistical analysis of the relationships between factors influencing the consumer experience or potential experience of SSMs.

The theory of planned behaviour (TPB) (Ajzen, 1991) was used as the

basis for this research and is commonly used in research on household food waste behaviour and intentions (González-Santana et al., 2022; Moldovan et al., 2022; Principato et al., 2021; Schanes et al., 2018). However, the TPB has been seldom applied in the context of factors influencing potential use of FAPs which stock surplus food. SSMs represent an intermediate model between more established food assistance and standard supermarkets. As such, it is important to understand perceptions, behaviours, and intentions which as a consumer may be present or more prominent than when accessing food in a crisis. This is due to factors of agency mentioned above, such as exchange of money or choosing products. In addition to the factors based on the TPB, this study explores the effects of experience of food insecurity, and sustainability orientation. Sustainability orientation or similar concepts have been explored in the food waste literature. However, both additional factors have not been explored in relation to intention to use surplus accessed through FAPs. Household food insecurity has rarely been included within models based on TPB, however not studied in this context. One of the few examples is Van der Velde et al. (2022) who showed the potential explanatory power of food insecurity in relation to dietary quality, using an extended TPB. Beyond mitigating the challenge of food insecurity, SSMs may also be important for a growing proportion of society if they have any place in normalising surplus food consumption amongst those who are not food insecure. For this reason, it is important to understand what influences the intention to use one.

This study seeks to evaluate the importance of various factors that influence consumers' intentions to use SSMs. This model of food redistribution was chosen as it is becoming a more prominent feature amongst a changing food redistribution landscape. The same can be said for the socio-economic conditions which are inherently linked to the demand for low priced surplus food. However, published research on consumer preferences in the context of FAPs is scarce. Food waste reduction policy or campaigns have tended to focus on these at the organisation level (Facchini et al., 2018) or primarily on non-surplus food at the consumer level (Reynolds et al., 2019). This prioritisation of efforts is understandable given the majority of consumers in the Global North do not rely on FAPs to meet their needs. However, food insecurity has been rising and efforts to reduce food inefficiencies across the whole system are becoming more critical with aims to reduce the environmental impacts of waste. Therefore, this study aims to focus on the rising number of people who may come to depend on services like SSMs and begin investigating the extent to which they can be utilised in tackling the dual goal of food waste and food insecurity reduction.

Following a literature review, hypotheses were built based on the TPB framework and subsequently a survey was used to test them. The survey was administered to a sample of British consumers whose responses were analysed using Principal Component Analysis (PCA) and Structural Equation Modelling (SEM). Presentation of results includes the reliability of the measurement model, model goodness of fit indicators and the effect sizes of relationships between latent variables, while the discussion considers the implication for circular economy, food waste and poverty reduction policy taking into consideration the limitations and areas for further research. The research contributions of this study are furthering understand of an understudied food assistance model which could become more prominent as surplus food becomes more important for food insecure communities, and providing the first statistical analysis of interactions between factors influencing intentions and perceptions which may precede the behaviour of using a SSM.

2. Literature review and hypotheses

A conceptual model was developed to explore how consumer characteristics and their perceptions of SSMs interact to influence the intention to use a SSM. The conceptual model considered the influence of consumers' perceptions of SSMs with regard to provision of a 'normal' shopping experience and SSM accessibility. The model also considered the influence of consumer characteristics such as perceptions of food

safety and quality, price consciousness, sustainability orientation and past experience of food insecurity.

The survey questionnaire and the conceptual model underlining it were built from relationships identified in a literature review. The conceptual model was also built using the theory of planned behaviour (TPB) (Ajzen, 1991, 2013). The TPB states that an intention to perform a behaviour is predicted by attitudes towards the behaviour, perceived social acceptance of the behaviour, or subjective norm, and perceptions of control over one's ability to perform the behaviour, defined as perceived behavioural control (PCB). These three categories are informed by salient beliefs, which can be described as a small number of the total beliefs an individual may hold about a given behaviour. As described above, due to the relative infancy of research on SSMs, particularly in relation to consumer preferences, literature supporting preferences of users of foodbanks or other food assistance models were considered.

The subjective norm in the model is consumer normalcy. Consumer normalcy was introduced by Baker et al. (2005) to understand the symbolic and experiential value of shopping to visually impaired consumers. The concepts are 1) being part of the marketplace, 2) exploring distinction or individuality through consumption, 3) demonstrating control and self-autonomy, and 4) perception of social belonging through equality with other consumers. Subsequently, the concepts were applied by Bedore (2018) in the context of the shopping behaviour of food insecure individuals who stated factors such as freedom of choice, ability to exchange money for goods and performing thrifty shopping practices such as value-seeking, as important reasons for preferring a community food project over foodbanks. Similar theories were also explored by Woodruffe-Burton and Wakenshaw (2011) in a study of consumers not experiencing food insecurity, who nonetheless, revealed important concepts concerning the potential links between grocery shopping and identity. These are elements of the shopping experience which the SSM model intends to reintroduce or expand for people that require food assistance.

The TPB predicts that PBC can influence the intention to perform a specific behaviour. The model predicts that those who perceive access to SSMs or similar forms of food assistance as difficult are less likely to intend to use them. As SSMs are an emerging model, it was assumed most survey respondents would not have experience of them. To gauge how they would perceive ease of access to one, the questions also included foodbanks or other forms of food assistance. Physical accessibility can be limited based on the information available or lack of means to travel to foodbanks, or other forms of food assistance (Tarasuk et al., 2020; Loopstra and Tarasuk, 2012). Multiple interviews with food charity recipients have stated inadequate transport links or lack of funds for transport as an access barrier (Pollard et al., 2019; Booth et al., 2018a; 2018b; Middleton et al., 2018; Perry et al., 2014). Holweg and Lienbacher (2016) found that for SSM users in several European countries, location was one of the most well received features and opening hours was one of the most suggested improvements.

Hypothesis 1. Perceptions of consumer normalcy positively influence attitudes towards SSMs

Hypothesis 2. Perceived accessibility to SSMs, foodbanks or other forms of food assistance positively influences intention to use one

Hypothesis 3. Positive attitudes towards SSMs positively influences intention to use one. These relationships are outlined in Fig. 1.

2.1. Food safety and food quality

Food seen by consumers as deviating from 'optimal', either visually or by other characteristics, have been shown to have limited appeal in standard supermarket settings (Hartmann et al., 2021), even where saving money or food waste reduction are explicitly communicated to increase purchasing (Aschemann-Witzel, 2018), due to concerns about

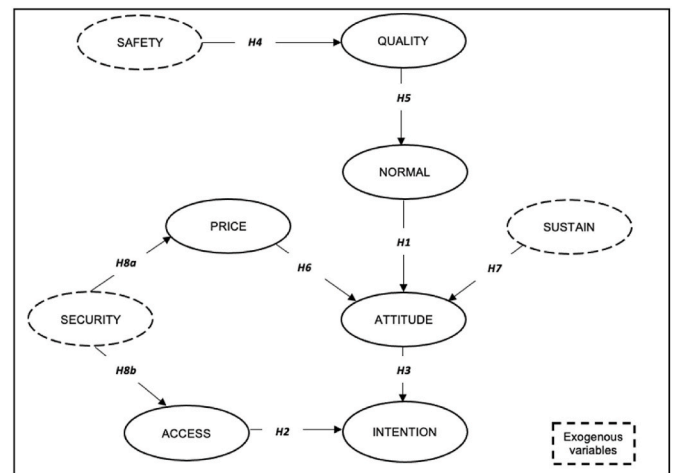


Fig. 1. Conceptual model of SSM use intention process. ACCESS (Physical Access to SSMs, Foodbanks or Other Forms of Food Assistance), ATTITUDE – Attitudes Towards SSMs, INTENTION (Intention to use a SSM), NORMAL (Consumer Normalcy), PRICE (Price Consciousness), QUALITY (Perceptions of Food Quality), SAFETY (Perceptions of Food Safety), SECURITY (Past Experience of Food Insecurity), SUSTAIN (Sustainability Orientation).

affecting food quality and safety. A review of consumer barriers to purchasing 'suboptimal' food revealed that in most circumstances, willingness to pay decreases throughout the shelf life of a product as the risk associated with products approaching their expiration dates increases. The degree to which food needs to be discounted for it to be purchased varies dependent on the specific quality of the food that makes it 'suboptimal' (Hartmann et al., 2021; White et al., 2016). Concerns about limited utility from food close to its expiration date are also outlined in the primary SSM literature referenced above, but again not from consumer data. It was theorised that SSM consumers will find food they perceive to be safer as having greater quality. It was also theorised that SSM users may perceive a greater feeling of social belonging when the food available in SSMs is of closer or equal aesthetic and nutritional value to that found in standard supermarkets.

Hypothesis 4. Perceived higher standards of food safety positively influence perceptions of food quality

Hypothesis 5. Perceived higher standards of food quality positively influence perceptions of consumer normalcy

2.2. Price consciousness

Price consciousness can be described as the degree to which the consumer focuses on paying low prices (Tsalis, 2020). This attribute has been positively linked to increased likelihood of consumers purchasing reduced price food nearing 'best before' or 'use by' dates (Tsalis, 2020; Aschemann-Witzel et al., 2018; Konuk, 2015). It is theorised that consumers who are more price conscious will hold more positive attitudes towards SSMs. This is because they can purchase food at substantially reduced prices in a supermarket setting.

Hypothesis 6. Price consciousness will positively influence attitudes towards SSMs

2.3. Sustainability orientation

Sustainability orientation in this context is defined in terms of how much consumers value the environmental dimension of sustainability. Food waste reduction is communicated as an intrinsic sustainability characteristic of SSMs and is expected to be part of the motivation to use them, although it is likely to be less prominent than financial hardship (Bech-Larsen et al., 2019; Company Shop, 2018). Golob et al. (2018)

found that sustainability orientation positively influences intentions to consume environmentally friendly products. Consumers considering 'suboptimal' food assess both self-interested aspects such as price and health (Stangherlin et al., 2019) and altruistic aspects such as sustainability (Giménez et al., 2021; Sautron et al., 2015). This is particularly relevant to consumers who, given the option, may use SSMs as a place to purchase surplus food even when not food insecure, to reduce the environmental impacts of food waste.

Hypothesis 7. Sustainability orientation positively influences attitudes towards SSMs

2.4. Food insecurity

The Scottish Health Survey (Scottish Government, 2022a) uses questions to measure varying levels of food insecurity, adopted from the UN Food Insecurity Experience Scale (FAO, 2014). These questions were included in the survey questionnaire used for this study, changing only the timescale from the past 12 months to the past 5 years to potentially include a wider proportion of respondents who may have experienced food insecurity. Similar questions are used to measure food insecurity in the Food and You Surveys, which apply to England, Wales, and Northern Ireland (Loopstra et al., 2019; Bates et al., 2017). An additional question was included, which asked if the respondent had used a foodbank or any other form of food assistance in the past five years. These questions determine varying levels of food insecurity related to concerns about running out of food, eating less than one thinks they should, or physically running out of food within a past defined period.

It is theorised that consumers with recent experience of food insecurity will be more price conscious as this characteristic could incentivise seeking greater value for money within a limited household budget. Zaki and Todd (2021) explored price consciousness in recipients of the US Government's Supplemental Nutrition Assistance Programme (SNAP), a programme which functions to mitigate food insecurity in low or no-income households. They found that recipients were more price conscious when a higher proportion of their personal food budget was SNAP funds. Schembri (2020) describes price sensitivity as a micro coping strategy during periods of limited financial resources. Consumers who have experienced food insecurity or impoverishment may be more likely to be making consumption decisions based on survival considerations (Puddephatt et al., 2020).

The conceptual model also theorises that consumers who have experienced a greater level of food insecurity in the recent past may perceive greater difficulty in accessing a SSM or other FAPs. As discussed above, people with experience of food insecurity may face access barriers such as limited opening hours but more commonly inability to travel to the location due to lack of money for transport (Hardcastle and Caraher, 2021; Hainstock and Masuda, 2019) or inability to transport the food back to their home. One example is people with disabilities who are overrepresented in UK foodbank use (Loopstra and Lambie-Mumford, 2023). Physical access barriers have been well explored in foodbank or FAP use literature but how a consumer perceives accessibility will depend on both the features of the FAP and their personal circumstances.

Hypothesis 8a and 8b. Past experience of food insecurity negatively influences price consciousness and perceived difficulty of access to SSMs or other forms of food assistance

3. Methods

3.1. Research design and data collection

A survey was developed, and recruitment of participants was carried out by a market research company. The company was asked to recruit a representative sample of the UK population of shoppers of food products. The market research company was required to adhere to the

following criteria in recruiting participants: (1) regional distribution - Scotland (50%), England (41%), Wales (5%), Northern Ireland (4%); (2) gender distribution - female respondents 60%, male respondents 40%; (3) age distribution - participants older than 18 years; (4) shopping behaviour - participants fully or partially responsible for the purchase of food products in the household; (5) household income distribution - income below the poverty line (approximately £17.7k for average household, variable depending on household type [2020 figures]) (67%), income above the poverty line (33%). All the predefined quotas were fully achieved.

The number of observations in this study was 676 with an effective sample size of 486. The survey contained 54 indicator questions and 3 socio-demographic questions (employment status, education, and number of people in household). See Appendix I for full survey.

The indicator questions were built from studies which established relationships between specific variables, as outlined above, or were designed according to elements of the Theory of Planned Behaviour (Ajzen, 2013). Most indicator questions were built on a Likert scale, with those on past experience of food insecurity being dichotomous. As some SSMs allow all members of the community to use them, and as they may have potential as normalised retail environments for surplus food, it was important to also consider consumers who may use a SSM not out of necessity. This could be for reasons such as a desire to consume more sustainably through reducing food waste or simply to reduce food expenses.

3.2. Data analysis

Structural equation modelling (SEM) with observed and latent variables was used to estimate the influence of a priori identified factors on the intention to use a SSM. The elements defined in the conceptual model were built as latent variables, defined as multidimensional concepts measured by aggregating indicator variables corresponding to survey items. The SEM consists of two models, the measurement model, defining the relationships between the latent and observed variables (equation (1)), and the structural model which defines the causal relationships between the latent variables (equation (2)) (Jöreskog and Sörbom, 1993):

$$\text{Measurement model: } x = \Lambda_x \xi + \delta \quad (1)$$

$$\text{Structural equation model: } \eta = \mathbf{B}\eta + \Gamma\xi + \zeta \quad (2)$$

Where, η is a $m \times 1$ random vector of endogenous latent variables; \mathbf{B} is a $m \times m$ matrix giving the coefficients of the η variables in the structural model; Γ a $m \times n$ matrix of the exogenous latent variables; ζ is a vector of errors; x is a vector of q observed variables; Λ_x is a matrix of $p \times m$ coefficients of the relationship of x on ξ , ξ is a vector of n latent variables, δ is a vector of q error terms in x .

The analysis was conducted in the statistical software package LISREL 8.80 (Jöreskog and Sörbom, 2007). SEM estimation occurs by minimising the difference between the covariance matrix of observed variables, and the conceptual covariance matrix predicted by the model structure. As mostly ordinal variables were included in the model, the estimation method used was robust Diagonally Least Weighted Squares (DLWS). The Goodness of Fit (GoF) parameters considered for model assessment are: normed Chi-square ($\chi^2/\text{degrees of freedom } df$); Root Mean Square Error of Approximation (RMSEA); Standardised Root Mean Square Residual (SRMR); Goodness-of-Fit Index (GFI); Adjusted Goodness of Fit Index (AGFI); Comparative-Fit-Index (CFI) and the Normed-Fit-Index (NFI).

Alternative models were run in a nested approach and selection was based on proximity to the conceptual model and goodness of fit. Latent variables were validated with Principle Component Analysis (PCA) using varimax rotation. This is an orthogonal rotation to maximise the squared factor loadings on to each latent variable thereby minimising the number of high loading indicators required to identify a factor.

Reliability scores and factor loadings of indicators on latent variables can be found in [Table 1](#).

In conducting the SEM analysis, sustainability orientation and perceived difficulty of physical access to SSMs, foodbanks or other forms of food assistance were excluded from the estimated model due to low factor loadings of indicators and model observations/parameters ratio. Two latent variables not featured in the conceptual model featured in the estimated model. These were 'Knowledge of SSMs, foodbanks or other forms of food assistance' (KNOW) and 'Perceived Risks in Using a SSM' (RISK). KNOW measures the extent of consumer awareness of food assistance, how to access information about them and environmental effects of food assistance using surplus food. These could be SSMs, other food surplus programmes or sections of standard supermarkets selling food near the 'best before' or 'use by' date. This represents an adaptation of the ACCESS latent in the conceptual model as KNOW includes indicators related to access to information. RISK measures the degree to which consumers perceive risks associated with SSM use. The inclusion of these latent variables is further explored in the discussion.

Perceived food quality and safety indicators were strongly correlated and naturally loaded on the same factor, and thus were merged into one latent variable; this was done to improve the reliability and validity of these measurement scales. This is also in accordance with empirical evidence. [Grunert \(2005\)](#) suggested that safety can be thought of as a feature of quality rather than distinct. This is supported by [Van Rijswijk and Frewer \(2008\)](#) who analysed the relationship between safety and quality and found that two thirds of respondents perceived a strong relationship between them with respondents consistently expressing a feeling that one feature infers the other, primarily that quality infers safety. A further 12% perceived them as practically indistinguishable.

Table 1
Reliability of measurement model.

Latent Variable	Indicator	Loadings	Cronbach's alpha
SECURITY	securit1	0.872	0.824
	securit2	0.806	
	securit3	0.826	
	securit4	0.728	
QUALSAFE	quality1	0.851	0.927
	quality2	0.846	
	quality3	0.852	
	quality4	0.826	
	safety1	0.819	
	safety2	0.798	
	safety3	0.832	
	safety4	0.694	
NORMAL	normal1	0.859	0.851
	normal2	0.847	
	normal3	0.835	
	normal4	0.783	
PRICE	price1	0.813	0.745
	price2	0.845	
	price3	0.785	
KNOW	know2	0.851	0.773
	know3	0.855	
	know4	0.781	
	risk1	0.855	
RISK	risk2	0.810	0.677
	risk4	0.676	
	attitud1	0.794	
ATTITUDE	attitud2	0.785	0.836
	attitud3	0.823	
	attitud4	0.705	
	attitud5	0.777	
	intent1	0.771	
INTENTION	intent2	0.821	0.887
	intent3	0.820	
	intent4	0.776	
	intent5	0.834	
	intent6	0.777	

4. Results

Measurement model results indicate that factor loadings are all above an acceptable threshold of 0.5 ([Kline, 2015](#)) and thus support the theory-based allocation of indicators to their corresponding latent variables ([Table 1](#)). Indicator questions used to build latent variables can be found in [Appendix II](#). The estimated model is presented in [Fig. 2](#) with effect sizes between individual latent variables.

The primary goodness-of-fit (GoF) measures showed values within acceptable ranges ([Table 2](#)). Total (direct and indirect) effects of latent variables on each other can be found in [Table 3](#). The best-defined model explains 64% of the variance in intention to use a SSM ([Table 4](#)). Six new relationships were established in the estimated model. Three are direct effects of latent variables - past experience of food insecurity, price consciousness and knowledge of SSMs, foodbanks or other forms of food assistance - on intention to use a SSM. The fourth is the effect of price consciousness on perceptions of consumer normalcy, the fifth, perceptions of consumer normalcy on perceived risks of SSM use, and the sixth, perceived risk of SSM use on attitudes towards them.

The relationships between consumer normalcy, perceived risks and attitudes towards SSMs comprised the three strongest effects seen in the estimated model ([Table 3](#)). Consumer normalcy positively influences attitudes towards SSMs directly and indirectly via perceived risks (0.78), thus supporting H1. Consumers who perceive greater consumer normalcy in SSM use are less likely to perceive risk in using one (-0.79). Perceived risk negatively influences attitudes towards SSM use (-0.67), suggesting that consumers who perceive less risks in using a SSM are more likely to have positive attitudes towards them. The estimated model shows that respondents with greater knowledge of food assistance have a stronger intention to use one. As knowledge of food assistance can be assumed as a proxy for having greater access, this partially supports H2. The model also shows that attitudes towards SSMs positively influence the intention to use one, thus supporting H3. The effect size of this relationship (0.63) was the strongest of all total effects on intention to use a SSM.

Perceptions of food quality/safety positively influenced consumer normalcy (0.12), meaning that respondents who were more sensitive to food safety/quality concerns showed stronger perceptions of consumer normalcy in using a SSM. With the reasoning for merging perceptions of food quality and food safety into one latent variable, this supports H4 and H5. H6 was not supported as price consciousness was not found to have a direct effect on attitudes towards SSMs but instead on intention to use a SSM and perceptions of consumer normalcy. H7 was not supported as the data could not support the sustainability orientation latent variable. Past experience of food insecurity negatively influenced price consciousness (-0.22) and knowledge of SSMs, foodbanks or other food assistance (-0.30), meaning that those with a more severe past experience of food insecurity were more price conscious and had greater knowledge of food assistance options. This supports H8a but not H8b as it was hypothesised that past experience of food insecurity would link to perceptions of greater difficulty in accessing a SSM. This was primarily focused on physical access. As mentioned above, if greater knowledge of SSMs and other forms of food assistance is thought of as increased informational access, then this would contradict H8b. A weaker effect of the same variable is also seen on intention to use a SSM (-0.15).

5. Discussion

The objective of this study was to evaluate the effects of various factors on intention to use a SSM. To our knowledge, there is no research that looks at factors influencing the intention to use a FAP or the behaviour of using FAPs that supply redistributed food. The estimated model explains 64% of the variance while mostly adhering to the conceptual model and supporting 5 of the 8 hypotheses. This suggests that the factors inferred predominantly from qualitative studies about use of FAPs and the relationships between them were valid and provide insight

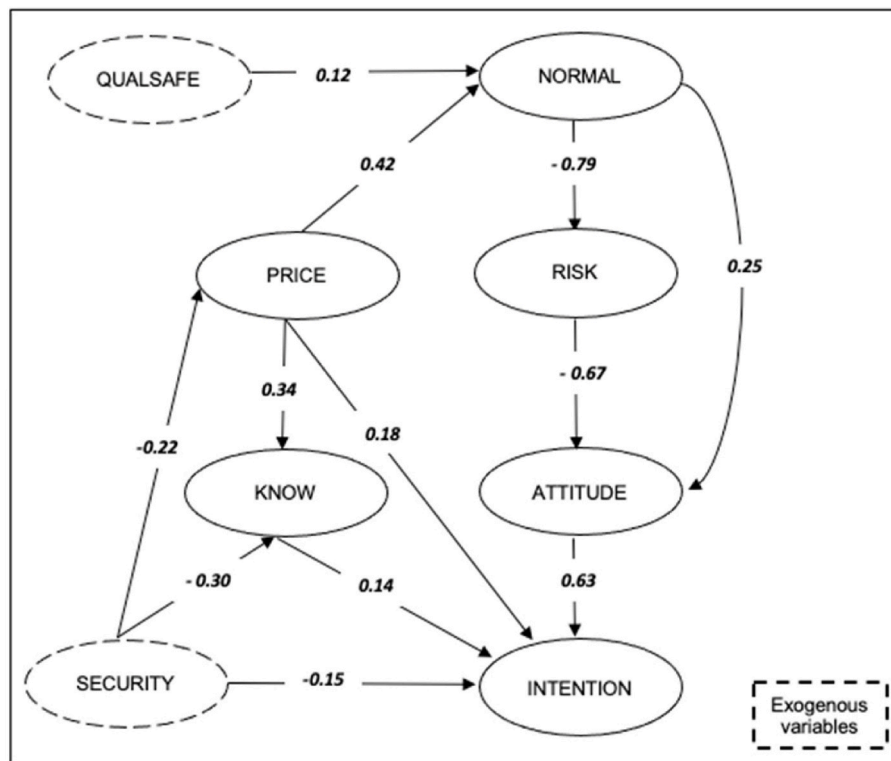


Fig. 2. Path Diagram for estimated model (standardised direct effects).

Table 2 Model goodness of fit.

Goodness of Fit Indicator	Estimated value	Acceptable range
χ^2 ^a	1655.36	
df	583	
Normed χ^2 (χ^2 / df)	2.84	1–3 (Kline, 2015)
p	0.00	<0.05
RMSEA	0.055	0.0–0.1 (Kline, 2015)
SRMR	0.073	0.0–0.1 (Kline, 2015)
GFI	0.95	0.9–1.0 (Westland, 2016)
AGFI	0.94	0.9–1.0 (Westland, 2016)
CFI	0.97	0.9–1.0 (Westland, 2016)
NFI	0.96	0.9–1.0 (Westland, 2016)

^a Satorra-Bentler Scaled.

into how consumers may view SSMs or other similar food redistribution models. The results suggest that the TPB is a sound basis for looking at intentions to use FAPs but that factors generally understudied such as food insecurity, consumer normalcy or PBCs specific to FAP use also can play an important part in furthering our understanding of why one may use them. There may also be a place for sustainability orientation or environmental views influencing the intention to use FAPs, but the data in this study did not support this.

Table 3 Standardised total (direct and indirect) effects (t values in parentheses).

Observed/Latent Variable	Total effect on					
	'PRICE'	'KNOW'	'NORMAL'	'RISK'	'ATTITUDE'	'INTENTION'
SECURITY	-0.22 (-3.23)	-0.37 (-7.40)	-0.09 (-2.99)	-0.07 (-2.80)	-0.07 (-2.87)	-0.29 (-6.19)
PRICE	-	0.34 (5.87)	0.42 (7.10)	0.33 (5.67)	0.33 (6.02)	0.44 (9.55)
QUALSAFE	-	-	0.12 (2.45)	0.09 (2.27)	0.09 (2.37)	0.06 (2.28)
NORMAL	-	-	-	-0.79 (-14.49)	0.78 (18.67)	0.49 (11.73)
RISK	-	-	-	-	-0.67 (-5.88)	-0.43 (-5.46)
KNOW	-	-	-	-	-	0.14 (3.18)
ATTITUDE	-	-	-	-	-	0.63 (13.17)

The conceptual model did not include the latent constructs knowledge of SSMs, foodbanks or other forms of food assistance (KNOW) and perceived risk in SSM use (RISK). Knowledge of different FAPS and how to access relevant information such as locations and opening times have been identified in survey data from other studies exploring access barriers (Larson et al., 2021; Piaskoski et al., 2020; Ginsburg et al., 2019). As there were few SSMs in the UK at the time of this study, awareness of them was expected to be low. However, based on the SSM description provided in the survey and consumer familiarity with purchasing food near the 'best before' or 'use by' date in standard supermarkets, it was felt the respondent would have sufficient information to consider the behaviour and their intention towards it. SSMs do not only sell food near

Table 4 Squared multiple correlations for structural equations.

Dependent Latent	Variance Explained
PRICE	0.05
KNOW	0.25
NORMAL	0.19
RISK	0.62
ATTITUDE	0.78
INTENT	0.64

the 'best before' or 'use by' date but nonetheless this experience could be important. When further explaining PBCs, 'Ajzen (1991) states they are assumed to be formed by experience and anticipated barriers, and form part of the control beliefs which dictate someone's perceived ability to perform the behaviour. Vermeir and Verbeke (2008), when looking at consumer intention to purchase sustainable dairy products, highlighted that past experience with these products was likely low. Consumers relied mostly on survey description, and it could follow that they may then perceive it as more difficult to acquire. While the relationship between PCB and intention predicted by the TPB is seen, this could potentially be stronger where respondents could relate to a SSM or FAP with features mentioned that they knew existed, or had visited themselves.

The influence of perceived risks on attitudes towards a behaviour feature in the TPB and other theories of consumer behaviour. As mentioned above, the TPB states that attitudes towards an intention are influenced by beliefs about that intention. Beliefs may be more positive or negative and, as has been outlined in other behavioural theories, their weighting could determine intention to perform a certain behaviour. This can also be presented as perceived risks and benefits of performing that behaviour. Other theories such as the Fishbein multi-attribute model (Fishbein, 1963) and Lancaster's Theory of Consumer Demand (1966) also emphasise the weighting of different attributes in determining the attitude towards, or the perceived utility of a product. Risks included in this study referred to normalising the systemic causes of food poverty and food waste, which are featured in the most prominent SSM literature to date (Saxena and Tornaghi, 2018; Holweg and Lienbacher, 2016). No empirical evidence for acceptance of different FAPs feature in the literature. However, there is evidence from marketing research on how weighting of attributes influences the choice of supermarket or shopping centre (Nilsson et al., 2015; Hsu et al., 2010; Theodoridis and Chatzipanagiotou, 2009; Oppewal et al., 2006).

Another risk considered is perceptions of affordable food availability for others considered most in need. Bedore (2018) found that users of a community food box programme in the USA, where fresh produce was delivered to homes at wholesale prices, expressed their preference for it over foodbanks to "leave those programmes to families that really need it". This is partially echoed by Tarasuk et al. (2020) who found the most common reason Canadian food insecure households did not use a FAP was personal reservation to only use them during what the respondents felt was a period of true crisis. This could be understood as trying to be pragmatic about a potentially limited resource if, for example, there is a per household limit on service use. However, this also highlights how some may deliberately avoid or delay SSM use out of altruism where view their use as diminishing food availability for others.

5.1. Food safety and food quality

Respondents who were more sensitive to food safety/quality concerns showed stronger perceptions of consumer normalcy SSM use. This emphasises the link between perceptions of food standards and how much consumers may feel food assistance models are stigmatising or alienating. In a study on UK foodbank use and stigma, Purdam et al. (2016) found that assistance recipients consistently identified an association between the 'cheapness' of food and poorer quality. This discourse is common across food bank use in high-income countries (Oldroyd et al., 2022; Middleton et al., 2018), and SSMs or similar FAPs may need to overcome this association to maximise appeal. These concerns with quality are also linked to lack of choice, so SSM emphasis on shopping autonomy and 'high-quality surplus' via choice of products may somewhat regulate this negative link.

5.2. Price consciousness

Price consciousness was not found to have a direct effect on attitudes towards SSMs but on perceptions of consumer normalcy and intention to

use a SSM. One theory about what may contribute to this is enjoyment or pleasure from encountering lower prices when shopping. Zielke (2014) looked at the effects of shame, guilt and enjoyment on intention to use a discount supermarket (e.g. Aldi, Lidl) with one model for low price consciousness consumers and one for high price consciousness. In the model for high price consciousness, consumers' feelings of enjoyment, and those of shame and guilt showed stronger positive effects and respectively, stronger negative effects on intention to use a supermarket than in the low price consciousness model. The same study outlines how shopping in discount supermarkets may be a proxy for thriftiness and seeking greater value for money behaviours. Consumers' perceptions of stigma are lower as shopping for deals or low priced products of sufficient quality can be seen as a normal and pragmatic way to buy food. Value seeking behaviours like this are seen across income categories (Orhun and Palazzolo, 2019; Piacentini et al., 2001). Stigma or shame in using a SSM may be reduced in more price conscious consumers who would view it as a practical decision to make use of the resources available to you whether you are in a state of food insecurity or not.

5.3. Sustainability orientation

The sustainability orientation latent variable was not supported by the data. This could imply that while there is a waste reduction benefit in a model such as SSMs, this concept is not relevant to consumers when considering use of one or another FAP. Aschemann-Witzel et al. (2020) found that consumers of 'suboptimal' food can be viewed as environmentally concerned by others but that this view is linked to how those people perceive themselves when consuming it. This projection of their own characteristics may indicate that environmental or sustainability concerns related to food waste were not important for survey respondents. Understandably, this is not the most prominent concern when considering use of a SSM as their association is more likely to be that of food insecurity, poverty or social welfare.

The goal of SSMs is to support households struggling with food insecurity via provision of surplus that may otherwise be wasted and not vice versa. This raises important questions about how much emphasis should be put on SSMs food waste reduction benefits when trying to promote them and encourage use to a specific community who may project their own beliefs on to it. A model such as the SSM can also add to the growing conversation around food waste for households that are not in or at risk of food insecurity. Currently, SSMs primarily exist for those who do not have access to adequate food. However, their position in the food provision landscape, containing both features of conventional supermarkets and food assistance, has the potential to open discussion around wider societal access to food surplus in the future.

5.4. Past experience of food insecurity

Those with past experience of food insecurity were more price conscious, had greater knowledge of food assistance options and had stronger intentions to use a SSM. In addition to waiting until times of true crisis, as described above, research has identified knowledge or physical access barriers as one of two primary themes for not using a food bank in times of food insecurity (Tarasuk et al., 2020; Fong et al., 2016). The degree to which someone's past experience of food insecurity influences how much knowledge they have today about food assistance services could depend on several different elements. A study exploring potential links between community food programmes and medical clinics providing food assistance to households in a paediatrics clinic in the US found that 63% of respondents had no prior knowledge of the programme which provided the food but 79% of them planned to use it again, and 73% said they felt confident they could find a food assistance site in their community (Cullen et al., 2019). Our study supports these findings and indicates that for many people there may be an access or knowledge threshold that, once crossed, can embolden them to use the programmes. Understandably, people who are food insecure may feel

vulnerable, and the effects of shame and stigma have been widely studied in literature on foodbanks use. This indicated focus should be on outreach. FAPs could investigate how to initiate first contact and make them visible and familiar to people to limit these negative factors and encourage use when required.

5.5. SSMs, equitable food provision and policy implications

The growing prevalence of models such as SSMs touches on broader questions about whether they normalise or provide a counterbalance to systemic forces which cause food insecurity. The proposed benefits of the model are described above in greater detail but can be summarised as having strong potential to overcome the primary issues with current food assistance. Namely, through emphasis of community development and dignified provision of food to disadvantaged groups (Stettin et al., 2022; Saxena and Tornaghi, 2018). Normalcy proved to be a significant factor in the causality analysis. This concept is of particular importance as some view redistribution of surplus food from corporations as creating a dichotomy of those who can, and those who cannot afford (Vlaholias-West et al., 2018). Saxena and Tornaghi (2018) described this as an ‘uneasy dualism’ and others argued that food provision will remain commodified and could even entrench further social divides in absence of social policy reform (Messner et al., 2020; Lambie-Mumford, 2019; Caraher and Furey, 2018). While there is some product variety offered in SSMs, the inherent unpredictability of the mainstream market will limit availability to SSM users in terms of quality, quantity and diversity. For critics such as Lohnes (2021) and Caplan (2016), current practices send an implicit message to food donors, government and food system corporate actors that this is the only way to tackle hunger. Foodbank users have noted that while grateful for the help provided, the overall experience was intimidating or uncomfortable and sometimes does not diminish with further use (Middleton et al., 2018). Those who have experienced food insecurity may view SSMs and their emphasis on personal development as a preferable method to help improve their circumstances. To meet the ultimate end goal of eliminating inequality or stigma, many argue that there must be broader aims beyond more efficient surplus redistribution (Papargyropoulou et al., 2022) and that food insecurity should be tackled on a rights basis as opposed to charity (Smith-Carrier, 2020).

Publicly funded programmes aimed at tackling food insecurity have been met with limited success in high-income countries. Programmes to mitigate increased food insecurity during the Covid-19 pandemic were found to be somewhat ineffective. These included the SNAP programme in the USA (Li et al., 2022) or Canadian government funding for well-established networks such as foodbanks or children’s breakfast clubs. This was criticised for not providing sufficient funding for the true demand and for not collecting sufficient data on user experience (Men and Tarasuk, 2021). Increased funding for existing models without co-ordination and consistent reporting across organisations may produce sporadic data of limited utility in assessing success.

In Europe, food assistance initiatives have been included in food waste, circular economy, or agricultural policy in different ways. In France, national and EU funding is available for food assistance provision with the aim of connecting agriculture and food assistance to support local agriculture, shorten supply chains and increase sustainability and access to food assistance (De Labarre et al., 2016; Caraher, 2015). The UK has a Circular Economy strategy, which sees the different administrations set aims to reduce waste and increase resource efficiency (DEFRA, 2020). Additionally, The Waste and Resources Action Programme (WRAP) have launched initiatives such as the *Love Food Hate Waste* programme to tackle household waste in the UK, and the “*Courtauld Commitment*” to encourage waste reduction in the grocery sector. Perhaps the most forthcoming in its inclusion of FAPs is the *Scottish Government (2022b)*, whose recent proposals include funding to strengthen community food redistribution. This is part of a broader attitude shift towards food waste due to its potential to alleviate food

poverty among other issues.

Policy shifts such as these may be welcomed by providers of surplus food. Both the lack of state intervention and the precarity in funding for charities were stated as concerns for providers in Portugal (Augusto, 2021). It would also be beneficial to better understand public opinion on the new FAPs. Knežević et al. (2021) found that respondents from four European countries showed general agreement with statements that SSMs should be integrated into the social welfare system, be partially financed by local government, or should have facilities provided by local or national government. The network of community initiatives utilising surplus food represents a significant opportunity to create cohesive policy for food waste and food poverty reduction at the national and local level.

6. Conclusions

6.1. Limitations and future research

One limitation of this study is that the conceptual model was built with available information from consumer experience with any FAP, including those with features SSMs actively aim to limit or eliminate. Qualitative studies with open ended questions for those who are regularly using a SSM would allow for further models to be refined and tested. This would allow for a deeper understanding of factors relevant to SSM users and what indicator questions would be relevant to build latent constructs. This would also remove another limitation which is respondents needing to envisage the behavioural intention based on the description provided. Another limitation is that the question of food insecurity in this survey did not measure the frequency or duration of food insecure instances. This would be useful in relation to access to information about FAPs. Were one or both factors greater for a given person, they may be more likely to encounter services by seeking them or be signposted to them. The data collected does not provide any scope to differentiate these.

Future research could explore factors influencing intention to use a SSM amongst those who are not food insecure, emphasising the low-cost surplus food for waste reduction as opposed to food insecurity. The survey tried to cover both aspects but potentially separating them could allow factors, such as sustainability orientation, that may not be shared among the groups to be identified and their effects more clearly observed.

The results of this study highlight the need for further empirical evidence on SSM or FAP use. Understandably, research has focused quantitatively on these models in the context of health or nutrition and qualitatively in relation to experience of food insecurity or poverty. As these models become more prominent and have the potential to become part of a co-ordinated food surplus nexus, it is important to study them from usage through to outcomes. On the latter, research which followed the experiences of ‘novel food pantry’ use in the US, with identical or similar features to the SSM model emphasising self-efficacy as an optional goal, found improvements in diet quality and reductions in food insecurity (Sanderson et al., 2020; Wolfson and Greeno, 2020; Martin et al., 2013, 2016, 2019). Future research can strengthen the understanding of why people may intend to use a SSM or FAP and build on the findings of this study to assess the behaviour itself. There is potential for social and environmental interdisciplinary research to further investigate how surplus food can be utilised to improve welfare and limit food waste.

6.2. Implications

The results of this study highlight significant interactions amongst factors which influence intention to use a SSM. The results establish the importance of some factors already explored in previous research related to consumer preferences for surplus food such as price consciousness and perceptions of food quality and safety. However, in this

study the importance of factors significant to FAPs and the potential vulnerability of those using them can be seen. Namely, past experience of food insecurity and perceptions of consumer normalcy. This suggests that sensitivity towards these broader concepts related to respect of past and current experience is required when trying to understand why someone might use a FAP. This study provides initial insight into this unique model of food provision and research on existing SSMS and its customers could build on results seen here. Further, a broader look at the efficacy of the model through analysing potential to reduce the twofold issue of food waste and food insecurity is required. Tackling food insecurity and food waste will require a heterogenous approach combining policy with local initiatives which have the capacity to adapt to the increasing supply of surplus food. At the same time the provision of this increasing supply needs to prioritise the dignity of those who require assistance with acquiring food. As these initiatives become more prevalent research is needed to understand their features and the communities who rely on them. SSMS offer one iteration of this which can serve to reduce stigma attached to FAPs.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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Appendix A. Supplementary data

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