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Deliverable 2.1

Literature-based mapping of drivers for behaviour change in the food system

Work Package 2 Mapping levers and lock-ins in the Food System

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Executive summary

The objective of Deliverable 2.1 of the VISIONARY project was to perform a literature-based mapping of drivers for behaviour change in the food system to conclude the behavioural dimension of the transition to sustainable food systems from existing literature reviews. This was achieved by performing an umbrella review of systematic and structured literature reviews conducted in relation to the behavioural aspects of sustainability transition in food systems. This review resulted in a systematic mapping of the factors influencing behavioural change of food system actors (so called 360° Reviews) and a narrative synthesis of the recommendations made by the selected reviews.

Preferred Reporting Items for Systematic Reviews and Meta-Analyses Search(es) (PRISMA) was applied for reporting and documenting every major step and intervention throughout the review process.

After thoroughly searching, screening, and extracting the retrieved literature, 70 structured literature reviews made the final list of records subject to analysis. These 70 reviews are related to five major domains of food system discourse: sustainable farming, sustainable food consumption, food waste, the food supply chain, and the circular food system. Selected reviews about sustainable farming (21 records) and sustainable food consumption (21 records) have been subject to targeted analysis. The former resulted in a 360° review of factors grouped into 10 main categories, 53 parent subcategories, and 20 child subcategories. The latter resulted in a 360° review of factors grouped into 12 main categories, 69 parent subcategories, and 32 child subcategories. However, this review is further divided into three sub-domains: sustainable food consumption in general, organic food consumption and consumption of meat alternatives.

Recommendations made by the selected reviews for future research offered valuable information to outline a future research agenda for research on the sustainable transition of food systems. In the case of researching the adoption of sustainable farming practices, this research agenda should further explore the impacts of demographic changes in the farming population, the role of partnerships and advisory services, farmers' attitudes to subsidy dependence and various types of schemes (mandatory and voluntary), if possible, in a cross-culture or cross-country setup.

There has been also extensive scholarly attention paid to the various aspects of sustainable food consumption. In that increasingly active academic discourse, future research trends should further examine how consumers' price perceptions and connotations influence their food choices; what impacts of retail environments and the digitalisation of the food supply chain can be envisioned; what is the potential of increasing organic food availability in dietary change within geographically remote areas; what influence can be attributed to eco-labels on consumers' buying behaviour; or how meat alternatives can overcome the gastronomic and hedonistic arguments for meat consumption.

Furthermore, this review provides insights into various aspects of food supply chain research. These include the examination of the advantages and challenges associated with reducing carbon emissions in the food and beverage system, the analysis of factors influencing collaboration behaviour within the agri-food supply chain, the investigation into the background factors that impact consumer loyalty in food marketing, and the study on the efficacy of green nudging and its impact on the behaviour of actors within the food supply chain.

The findings of this review will contribute to the shaping of the VISIONARY project's case study research and will support the completion of future milestones and deliverables of the project with a comprehensive collection of references.

1. Introduction

1.1. Task description and location in VISIONARY's activities

Deliverable 2.1 aims to report on the completion of Task 2.3 (Mapping the enabling internal and external factors). This task consists of a systematic literature review to map levers and lock-ins to give an overview of drivers for behaviour change and their relevance to specific actors in the food system and specific value chains. In that sense, specific reviews need to be carried out for farmers, consumers, policymakers/ administration and retailers and other actors of the food value chain. The findings of this review will contribute to the shaping of individual case study research (informing case studies' focus and comparability) and will support the completion of future milestones and deliverables of the project with a comprehensive collection of references.

1.2. Background

1.2.1. Approach to Task 2.3: Mapping the enabling internal and external factors

Academic interest in better understanding the different drivers and barriers affecting food system actors' decision-making has been rapidly increasing. This quickly growing interest in such empirical evidence has produced an extensive body of literature reporting on the efficacy of actual interventions, willingness to change/ adopt/ pay type of experiments, or self-reporting opinion surveys. Unsurprisingly, the expansion of this field of theoretically and methodically heterogeneous studies has resulted in an increase in the number of literature reviews that attempt to bring together empirical understandings and syntheses regarding the transition towards sustainability in food systems. These reviews primarily focus on identifying the various elements that either encourage or discourage behavioural change among food system actors.

All of this has been reinforced by several preliminary scoping literature reviews performed by WP2 partners that looked into the extent of the literature that will be examined in this review. The findings gained from these scoping reviews, along with the recommendations provided by the external Scientific Advisory Board (SAB), have shaped our approach to Task 2.3. Therefore, Task Lead AKI in agreement with WP2 partners decided to complete Task 2.3 by conducting a review of existing literature reviews, with careful consideration given to the timeframe available for this task and the apparent absence of such tertiary evidence synthesis in the academic debate on the transition towards sustainable food systems.

The authors of this review (CRT - Core Review Team) and WP2 partners (BCT - Broad Review Team) made certain guiding choices that determined the approach of this review. Moreover, a preliminary review protocol was created in M4 (February 2023). The protocol was used as a baseline review plan that outlines the main elements and steps of the review process, but it has been iteratively modified throughout the review process (M4-M13). These iterations always offered opportunities for the Broad Review Team to provide input for the process.

1.2.2. Umbrella review of systematic reviews

Systematic literature reviews are evidence syntheses following a rigorous, objective and transparent process in order to reduce or avoid potential bias (selection or publication) and providing clear description of inclusion and appraisal decisions (James et al., 2016).

Research evidence is hierarchical and can be interpreted by a continuum of three levels of research. Primary studies usually collect and analyse first-hand data to address certain problems or answer certain research questions (e.g. case studies, experimental studies, etc.). Secondary studies aim to

synthesise these often incoherent primary studies in a powerful, robust, and transparent way (e.g. rapid reviews, scoping reviews, systematic literature reviews, meta-analysis, etc.). Tertiary studies include reviews of reviews to map, report, and appraise systematic reviews (e.g. meta-epidemiologic studies, umbrella reviews, overview of reviews) (Biondi-Zoccai, 2016).

Umbrella reviews are typically narrative or qualitative summaries of existing systematic reviews. Although the umbrella review technique is a relatively new and unexplored tool, especially in social sciences, it is thought to be a useful element for the theoretical foundation of any research activity, because such reviews provide an overview of already synthesised research evidence through a systematically-framed perspective (Aromataris et al., 2020). Such an evidence synthesis framework has been gaining importance in managing research evidence and decision making in various fields of disciplines (Biondi-Zoccai, 2016). The Task 2.3 review applied Grant and Booth's definition: an umbrella review "*specifically refers to review compiling evidence from multiple reviews into one accessible and usable document. Focuses on broad condition or problem for which there are competing interventions and highlights reviews that address these interventions*" (Grant & Booth, 2009, p. 95).

Regarding the mapping aspect of this review, systematic mapping is defined as method that collects, describes, and catalogues available evidence related to a topic of interest. It helps develop a better understanding of concepts, identify policy-relevant questions, and identify knowledge gaps. Systematic mapping also follows rigorous, objective, and transparent processes. It is particularly useful for broad, multi-faceted questions that may not be suitable for a systematic review due to multiple interventions, populations, outcomes, or evidence not limited to primary research. Systematic maps play a crucial role in evidence syntheses, covering the breadth of science needed for policy-based questions (James et al., 2016). Unlike systematic literature reviews, systematic maps do not provide statistical analysis on the effectiveness of the interventions being reviewed (Reisch et al., 2021).

Based on this understanding, this review followed a review protocol designed to perform an umbrella mapping review of systematic and structured reviews having been conducted in relation to behavioural aspects of sustainability transition in food systems. This analytical approach and the content requirements of Task 2.3 contributed to the formulation of the review questions.

1.2.3. Review questions

The review question is a crucial component of every review exercise because it represents the review's main goal. Task 2.3 explicitly asks for an overview of factors, in the form of levers or lock-ins, that influence behaviour change of food system actors. In the representation of Conti et al. (2021) the nature of resistance to directional change in agri-food systems builds on three theoretical explanations: path-dependency, lock-ins and inertia. These three concepts have the descriptive and explanatory powers to reveal how choices in history co-evolve and are reinforced over and over by views, practices, routines, social habits, infrastructure, or organisational logics, thus establishing trajectories that are resistant to change. The authors also identify six thematic explanations of resistance: (1) technological persistence; (2) misaligned institutional settings, policies and incentives; (3) attitudes and cultures that cause aversion to change; (4) political economy factors that skew the direction of change; (5) infrastructure rigidities; and (6) research priorities. Most of these explanations have behavioural aspects (both individual and organisational), but these behavioural aspects have not yet been examined and systematised. To address this gap and fulfil Task 2.3, this review aims to answer the following question:

What can we conclude about the behavioural dimension of the transition to sustainable food systems from existing structured literature reviews?

The main review question contains two sub-questions:

- **What factors hinder (barriers) or facilitate (enablers) the behavioural change of food system actors towards sustainable food provision?**
- **What recommendations can be made for future research on sustainability transitions in agri-food systems (what remains unknown or under-studied in the discourse)?**

Below, we present the structure of this review. The Methodology section consists of four parts. First, the search strategy and the primary research aim are described, which is followed by the explanation of search terms, strings and the process used to retrieve the records. Section 2.3. summarises the screening process and how we selected the eligible papers for our review. Lastly, section 2.4. elaborates on the method of data extraction and coding which was done separately for articles related to farming and to consumers.

Our results are presented in section 3. The PRISMA flow chart serves as a comprehensive map for the selection of the included articles. Subsequently, we provide an overview of the general characteristics of the reviewed papers. Section 3.1. showcases the factors influencing the behaviour of food system actors in two parts: first, we summarise our findings related to farming articles (Section 3.1.1.), and then we present the results concerning consumer sustainable food consumption (Section 3.1.2.).

Based on the reviewed papers, in section 4. we summarise the potential research agenda for future investigations. Suggestions and recommendations are listed in a similar fashion for farming-oriented reviews (Section 4.1.) and for consumer-oriented reviews (Section 4.2.). Last, but not least, section 4.3 provides insights into various aspects of food supply chain research.

Finally, we end our review with some concluding remarks (Section 5.) and we address the limitations of our work (section 6.).

2. Methodology

2.1. Search Strategy

The methodology of this review partially followed the guidelines and standards for evidence synthesis in environmental management (Pullin et al, 2022). The first step in the development of the methodology was the design of a search strategy. The primary aim of such a strategy by definition is to collect a maximum of the available and relevant structured literature reviews, while minimising bias, and ensuring the review is rigorous, objective, and replicable. **The objective of the search strategy applied in this review was to obtain the most comprehensive body of structured literature reviews that synthesise primary empirical research on the determinants of behavioural change of food system actors in the context of a sustainable transition.** To achieve this objective, it was necessary to consider the conceptual diversity upon which VISIONARY is built. These concepts have been further elaborated and discussed in the project's Initial Conceptual Framework, while the links between these concepts and methodological approach have been discussed in the project's Analytical Framework to be released by Month 12. Indeed, the Analytical Framework (AF, Milestone 2.2) steers the empirical research of the VISIONARY project, with regard to policy interventions (WP3), to novel value chain initiatives and business models (WP4), and to leverage points in the agri-food systems (WP5). The AF aims to strengthen the approach of looking at the whole agri-food system, adopting a systemic approach as the frame of reference for all empirical work. The development of the AF was used to encourage all researchers with responsibility for a task to disclose their understanding of the system and to consciously reflect on how the research in Visionary can be located in the agri-food system. To this end, 11 qualitative interviews (based on mental model interviews) were conducted internally with responsible research partners. Thus, the AF supported an internal examination of the project's own understanding of the agri-food-system and allowed the various empirical works to be located within this system.

The AF also provides a structured framework for the research questions addressed and the relevant methodological approaches. The AF presents how the research questions of WP3-WP5 address the research gaps identified in the systematic literature review (D2.1). Last but not least, the AF provides an overview of the case studies in which the research questions are addressed and gives in this way a comprehensive overview of our methodological approach. In the implementation of the empirical work and the analysis of results, these research questions will be connected with the outcomes of this literature review, in particular, concerning the potential research agenda for food system-related sustainability research.

Therefore, this review provides only a conceptual map (Figure 1) to illustrate the conceptual diversity of VISIONARY.

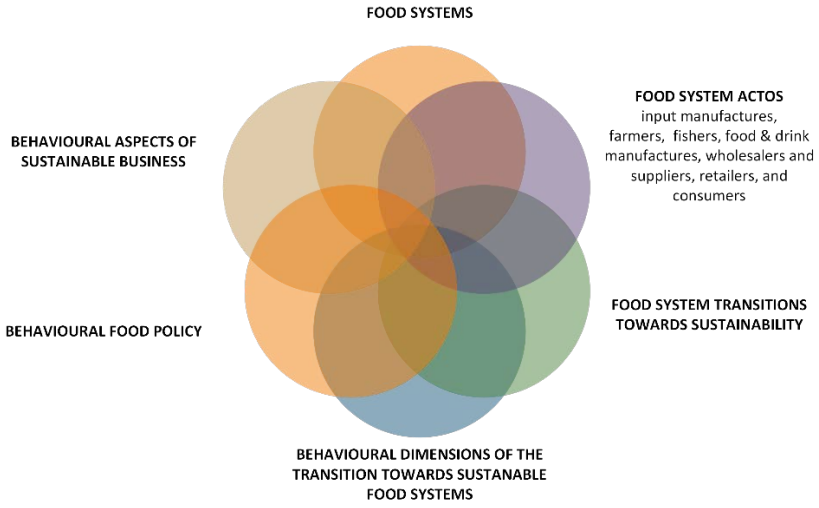


Figure 1 Concept map based on VISIONARY'S Initial Conceptual Framework

2.2. Search terms, search strings and search process

Search terms have a key function in outlining the scope of systematic literature searches in bibliometric databases. Search terms are often jointly derived from review questions, from inclusion and exclusion criteria, and from the underlying conceptual framework. In that sense, search terms used in this review can be thought of as a condensed and simplified version of the key concepts of VISIONARY. Table 1 includes the search terms that were pooled based on the findings of preliminary scoping reviews and the Initial Conceptual Framework.

CONCEPTS	POTENTIAL SEARCH TERMS
SUSTAINABILITY	"sustainable*" or "environ*"
FOOD SYSTEM	"food system" OR "agro food system" OR "agri food system" OR farming system" OR agriculture OR "agri-food sector"
FARMER	farmer OR agri* OR "food produc*"
FOOD CHAIN	"food value chain" OR "food supply chain" OR "agro value chain" OR "agro supply chain" OR "agri food value chain" OR "agri food supply chain" OR "agro food value chain" OR "agro food supply chain")
FOOD CONSUMPTION	food AND consum*
FOOD RETAIL	food AND retail* OR market
FOOD POLICY	food OR agri* AND policy OR scheme OR strateg*
BEHAVIOUR	behav*

Table 1 List of key concepts and their possible search term equivalents

These search terms were later transformed and combined into search strings with the use of Boolean operators (AND, OR, NOT). Twelve different and thematically focused queries were conducted on March 22, 2023. Table 2 presents more information on these thematically focused searches. The first search aimed to find food system-related reviews, the second one looked for reviews reporting on farmers' behaviour. The third one sought to find reviews on food retailing. The fourth searched consumer-related reviews. The fifth search looked for reviews focusing on the role of food retailers; while the sixth search retried papers with specific focus on the role of agri-food policies. This procedure was applied to meet the specific objective of T2.3, namely "*specific reviews will be carried out for farmers, consumers, policy makers/ administration and retailers and other actors of the food value chain"*. Table 2 and Table 3 show the search strings that the six "thematic queries" applied. Each thematic search was done in Web of Science and Scopus, was limited to records with the language in "English", and was not limited in terms of time range.

Database	Search theme	Search string
SCOPUS	Food system	(TITLE-ABS-KEY (sustainab* OR environment*) AND **TITLE-ABS-KEY ("food system" OR "agro-food system" OR "agri food system" OR "farming system" OR agriculture OR "agri food sector")** AND TITLE-ABS-KEY ("systematic review" OR "systematic literature review") AND TITLE-ABS-KEY (behav*) AND (LIMIT-TO (LANGUAGE,"English"))
	Farmer	(TITLE-ABS-KEY (sustainab* OR environ*) AND **TITLE-ABS-KEY (farmer OR agri* OR "food produc*")** AND TITLE-ABS-KEY ("systematic review" OR "systematic literature review") AND TITLE-ABS-KEY (behav*)) AND (LIMIT-TO (LANGUAGE , "English"))
	Chain	(TITLE-ABS-KEY (sustainab* OR environment*) AND **TITLE-ABS-KEY ("food value chain" OR "food supply chain" OR "agro value chain" OR "agro supply chain" OR "agri food value chain" OR "agri food supply chain" OR "agro food value chain" OR "agro food supply chain")** AND TITLE-ABS-KEY (behav*) AND TITLE-ABS-KEY ("systematic review" OR "systematic literature review")) AND (LIMIT-TO (LANGUAGE , "English"))
	Consumer	((((TITLE-ABS-KEY (sustainab* OR environment*) AND **TITLE-ABS-KEY (food) AND TITLE-ABS-KEY (consum*)** AND TITLE-ABS-KEY ("systematic review" OR "systematic literature review") AND TITLE-ABS-KEY (behav*)) AND (LIMIT-TO (LANGUAGE , "English"))
	Retail	((((TITLE-ABS-KEY (sustainab* OR environment*) AND **TITLE-ABS-KEY (food) AND TITLE-ABS-KEY (retail* OR market)** AND TITLE-ABS-KEY ("systematic review" OR "systematic literature review") AND TITLE-ABS-KEY (behav*)) AND (LIMIT-TO (LANGUAGE , "English"))
	Policy	((((TITLE-ABS-KEY (sustainab* OR environment*) AND **TITLE-ABS-KEY (food OR agri*)** AND TITLE-ABS-KEY ("systematic review" OR "systematic literature review") AND TITLE-ABS-KEY (behav*) **AND TITLE-ABS-KEY (policy OR scheme OR strateg*))** AND (LIMIT-TO (LANGUAGE , "English"))

Table 2 Search strings used in Scopus where colours indicate the "target group" adapted element of the search string

WoS	Food system	((((TS=(sustainab* OR environment*) AND **TS=("food system" OR "agro-food system" OR "agri food system" OR "farming system" OR agriculture OR "agri food sector")** AND TS=("systematic review" OR "systematic literature review") AND TS=(behav*)) AND LA=(English)
	Farmer	((((TS=(sustainab* OR environment*) AND **TS=(farmer OR agri* OR "food produc*")** AND TS=("systematic review" OR "systematic literature review") AND TS=(behav*)) AND LA=(English)
	Chain	((((TS=(sustainab* OR environment*)) AND **TS=("food value chain" OR "food supply chain" OR "agro value chain" or "agro supply chain" OR "agri food value chain" OR "agri food supply chain" OR "agro food value chain" OR "agro food supply chain"))** AND TS=(behav*)) AND TS=("systematic review" OR "systematic literature review")) AND LA=(English)
	Consumer	(((((TS=(sustainab* OR environment*)) AND **TS=("food")) AND TS=(consum*))** AND TS=(behav*)) AND TS=("systematic review" OR "systematic literature review")) AND LA=(English)
	Retail	(((((TS=(sustainab* OR environment*)) AND **TS=("food")) AND TS=(retail* OR market))** AND TS=(behav*)) AND TS=("systematic review" OR "systematic literature review")) AND LA=(English)
	Policy	(((((TS=(sustainab* OR environment*)) AND **TS=(food OR agri*)) AND TS=(policy or scheme or strategy*))** AND TS=(behav*)) AND TS=("systematic review" OR "systematic literature review")) AND LA=(English)

Table 3 Search strings used in WoS where colours indicate the „target group" adapted element of the search string

2.3. Screening and selection of reviews

Following the removal of duplicate articles, the members of the Core Review Team screened titles and abstracts. Retrieved records were managed with Zotero©[1] citation management software, while screening was done with the use of a free web tool called Rayyan©[2]. This tool allowed the review team to work with the retrieved records independently and blindly (team members did not see each other's decisions), so the impact of potential personal bias was minimised. Before the actual screening started, the screening process was piloted on a random subset (n=200) of the full set to see whether the eligibility criteria were clear enough and interpreted consistently by all the team members. This allowed team members to "train each other" and fine tune the eligibility criteria. Based on this experience with pilot screening, the eligibility criteria were slightly modified for more clarity (see Table

[1] Source: https://www.zotero.org/
[2] Source: https://www.rayyan.ai/

4). Screened reviews progressed to full-text screening if all reviewers voted for inclusion. Disagreements were mutually revised and discussed to find final consensus.

KEY SEARCH ELEMENTS	PRELIMINARY ELIGIBILITY CRITERIA	FINAL ELIGIBILITY CRITERIA
Context	**Included**: all reviews that include primary studies focusing on the various aspects of sustainability transition of food systems and relevant to the research question and objective.	**Included**: all reviews that include primary studies focusing on the various aspects of sustainability transition of food systems and relevant to the research question and objective. **Excluded:** hard scientific reviews in biology, life sciences, animal sciences, plant sciences, medicine, nutrition studies, and food environment studies.
Systematic reviews	**Included:** systematic reviews if it is clearly evident/ identifiable from the text (e.g. using eligibility criteria, recorded/ documented steps, clear research question) **Excluded**: no description of search strategy	**Included:** records if they clearly present evidence that reviews were conducted in a structured way (e.g. using eligibility criteria, recorded/ documented steps, clear research question) **Excluded:** no mention/ description of search strategy
Peer-reviewed articles	**Included:** original articles that provably underwent a scholarly peer review before publication.	**Included:** original articles that probably underwent a scholarly peer review before publication.
Type of reviews	**Included:** all types of review (quantitative, qualitative, and mixed-methods).	**Included:** all types of review (quantitative, qualitative, and mixed-methods).

Table 4 Preliminary and final sets of eligibility criteria for title and abstract screening

In the next step, selected reviews in full-text version were assessed against a new set of inclusion and exclusion criteria by the Core Review Team. This new set of inclusion and exclusion criteria was applied to make the judgements of the Core Review Team's reviewers as consistent as possible (see Table 5). This new set of criteria was intended to provide a common framework for the reviewers' work, as they worked individually, meaning that papers were divided among reviewers, so each reviewer assessed one set of papers at this stage. This approach introduced the risk of potential errors (e.g. selection bias remains undetected). In order to mitigate this risk, uncertain decisions were resolved by the intervention of a second reviewer. Furthermore, during data extraction and coding, included reviews were checked again for final eligibility.

	ELIGIBILITY CRITERIA
PUBLICATION TYPE	**Eligible:** original articles published in journals that probably underwent a scholarly peer review before publication **Not eligible:** book chapters, dissertation
REVIEW FOCUS	**Eligible:** reviews based on primary studies focusing on food system activities in relation to sustainability transition **Not eligible:** reviews not addressing the multidimensional nature of sustainability transition (e.g. reviews on nutrition intake or healthy diets without clear links to the concept of sustainability)
REVIEW RESULT	**Eligible:** Reviews reporting either barriers or enablers that impact behavioural change of key value chain actors (farmers, processors/ manufacturers, retailers, consumers) in the context sustainability transition. **Not eligible:** reviews that lack any statements (in results, conclusions, or implications) on barriers and enablers to behavioural change in the context of sustainability transition

Table 5 Final sets of eligibility criteria for full-text screening

2.4. Data extraction and coding

The systematic extraction of pertinent information from the records included in the evidence synthesis is referred to as data coding and data extraction. Data systematically extracted from each eligible review were the most important input for this review. According to Higgins and Green (2011), "*data*" refers to any information about (or derived from) a study, including qualitative and quantitative data describing bibliographic details or other details of research aims, review methods, geographical scope, context, and findings. The following information was extracted from included reviews: authors, publication year, journal title, author keywords, review aim, review type, number of eligible studies, database(s), time range, conclusions, limitations, and recommendations.

Data coding

Coding the full-text reviews served the objective of capturing behavioural determinants that had already been identified and reported by the selected papers. Coding was independently carried out by two CRT members, although not simultaneously due to the substantial number of selected reviews. It means that these two authors worked independently on their distinct sets of reviews. Coding followed an open or data-driven coding approach (inductive coding), so codes (i.e. factors) were constructed based on segments of the texts. Coding was done by QDA Miner Lite[3], a freely available software for qualitative content analysis. Only the result sections were coded to make sure that only synthesised data enters the review process. Coding looked for the determinants that the selected reviews identified as factors influencing the behaviour of food system actors. Considering that the selected reviews frequently categorised these factors based on their respective study goals, the coding process often preserved these groupings, which were subsequently incorporated into the evolving code structure of this review following a significant breakdown and reorganisation of codes developed by the aforementioned two CRT members. The results of this combination and reorganisation were maps of factors, which, in accordance with the authors' interpretation, provide a comprehensive list of the factors ever studied to better understand behavioural change in sustainable food production and consumption.

[3] Source: https://provalisresearch.com/products/qualitative-data-analysis-software/freeware/

3. Results

Preferred Reporting Items for Systematic Reviews and Meta-Analyses Search(es) (PRISMA) was applied for reporting and documenting every major step and intervention throughout the review process (Page et al., 2021). Following this guidance helped the review team to prepare a transparent, complete, and accurate report about the selection process and the included articles. PRISMA also provided guidance for tabulating and visually displaying review results. Review results are reported and illustrated with a PRISMA flow chart (Figure 2).

After compiling a list of the records (n= 1714) retrieved from the twelve thematically focused queries, duplicated records, and not eligible types of reviews were removed. This produced the list of records (n= 703) eligible for title and abstract screening. Following the title and abstract screening by the CRT, 563 records were excluded. The remaining records underwent a secondary title and abstract screening performed by three authors of the BRT. This step resulted in the exclusion of a further 30 records and the distinction between records based on whether they are consumption- or farming-oriented. The distinction was necessary because the number of consumption-oriented reviews significantly exceeded farming-oriented reviews. To address this imbalance, the 39 reviews identified as farming-oriented were subject to a backward citation search, meaning that the reference lists of these reviews were searched for any further citations in the hope that the number of farming-oriented reviews will increase in this way. Citation tracking identified 74 records. Furthermore, an additional 14 records were recommended by the BRT. These new additions (n=41) were first cleared of duplicates (n=6), then underwent another round of title and abstract screening, resulting in the exclusion of 37 records. These steps produced the list of records (n=154) eligible for full-text screening. Following full-text screening, 66 records were excluded. As a consequence, the list of records eligible for data extraction and coding included 88 records. During coding, another 17 records were excluded due to failing to meet eligibility criteria. Overall, a total of 70 records met the eligibility criteria (Table 5) and were included in this review.

The most noticeable finding of this review is the unbalanced characteristic of food system research: the scientific literature on the behaviour of food system actors has largely concentrated on farmers and consumers. Among the 70 systematic reviews included in this umbrella mapping review, 21 of them delve into the domain of sustainable farming, while an additional 21 reviews focus on sustainable food consumption. The remaining reviews are related to three other domains: food waste, food supply chain, and circular food system (Table 6).

Table 6 Thematic distribution of selected documents by level of analysis

	Number of reviews	Narrative synthesis	Mapping of factors
Sustainable farming-oriented reviews	21	✓	✓
Sustainable food consumption-oriented reviews	21	✓	✓
Food supply chains-oriented reviews	8	✓	
Food waste-oriented reviews	15		
Circular food systems-oriented reviews	5		

In line with the VISIONARY project's theoretical and conceptual foundations outlined in its Initial Conceptual Framework, the authors of this review conducted a targeted analysis by laying specific emphasis on farming- and consumption-oriented reviews. This added emphasis included thorough overviews and mappings of factors that have been identified in these reviews as influencing farmers'

and consumers' behaviour. The thoroughness and novelty of this review aim to provide valuable support for the implementation of VISIONARY case studies (See more about VISIONARY case studies in the Mapping contribution of selected case studies to VISIONARY to be released by Month 13). However, this review is also hoped to serve as a future reference point for other research endeavours in the field of food system research.

In addition to identifying behaviour-influencing factors, another important aim of the review was to address the imbalance in the literature by outlining a possible future research agenda for food system research. This has been done through the synthesis of the recommendations and suggestions for future research derived from the selected reviews. Therefore, in this agenda-setting endeavour, we have included not only the farming and consumer-oriented reviews but also the food supply chain-oriented reviews.

Regarding the remaining 20 reviews on circular food systems and food waste, these records were rightly identified by the systematic literature queries of this review because they are undoubtedly important parts of the academic discourse on food system. However, these two domains fall outside the scope of VISIONARY; therefore, this review did not include them either in the mapping or in the research agenda synthesis.

The remainder of this section presents a brief descriptive analysis of the selected reviews and a co-occurrence analysis on keywords. This will be followed by two 360° reviews of behavioural factors. The first review is based on the analysis of reviews on sustainable farming, and the second one on sustainable food consumption. Each of these reviews is accompanied by a reference guiding table that links the appearances of every behavioural factor to the selected reviews, thus supporting thematic searches between the large number of records included.

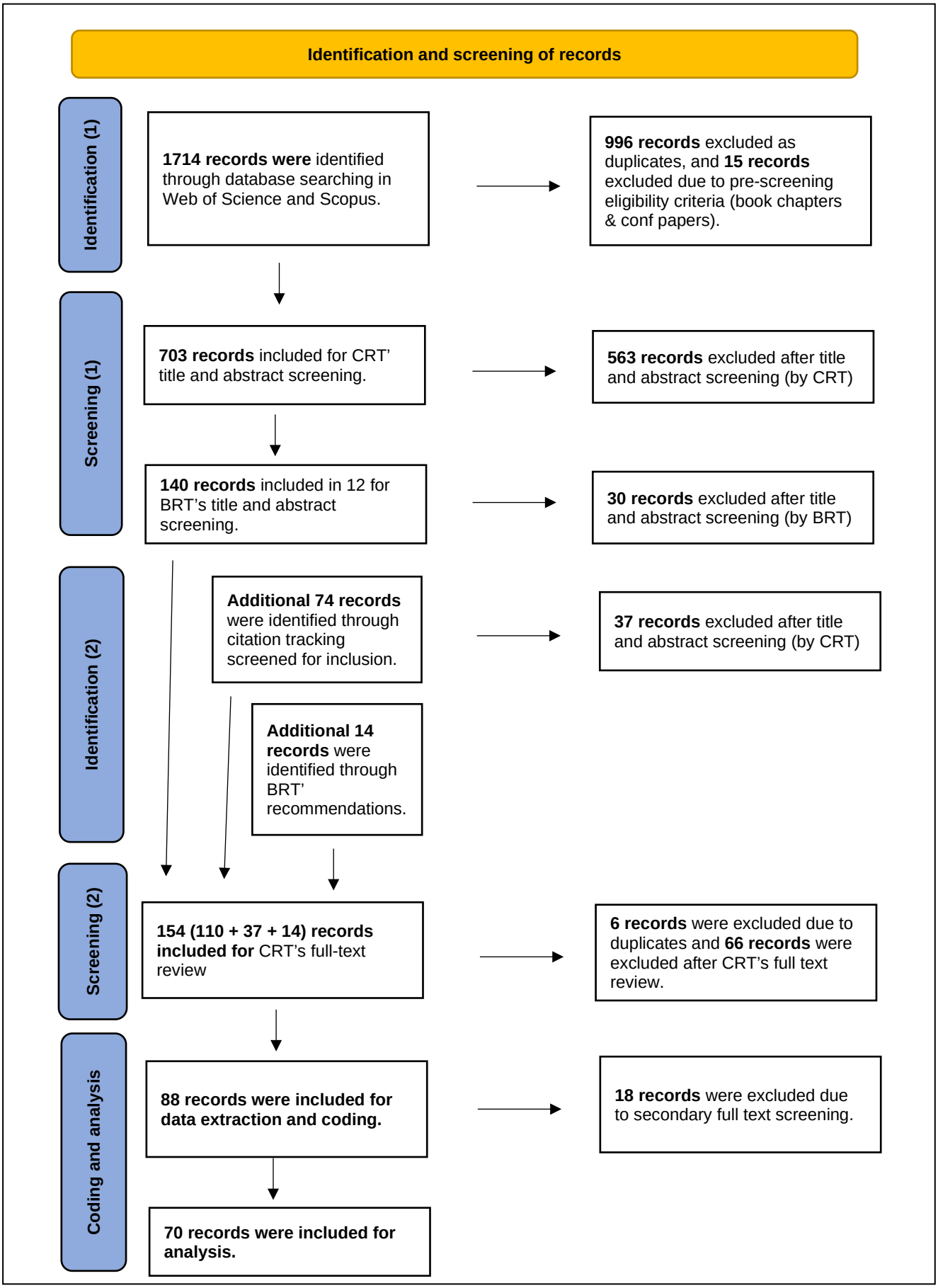


Figure 2 Figure PRISMA flowchart

Selected reviews are presented by the following characteristics: author(s), publication year, journal, review type, number of studies reviewed, databases, and time range of reviews. These characteristics of the selected reviews are summarised in the Appendix (Table 9)

Publication activity shows a clear upward trend, with an increasing number of publications since the 2000s (Figure 3). Even though the majority of the 70 selected reviews were published in the second half of 2010 or after, it is also evident that publication activity has significantly increased in the last ten years. The increasing quantity of literature reviews implies that the discussion around sustainability transitions of food systems keeps generating a greater number of primary empirical studies. It clearly demonstrates that there is an active and engaged scholarly interest in the subject.

Figure 4 represents the number of reviews published by journals (journals with a frequency below 2 are not presented). Eleven journals published more than one, while 31 journals published only one out of the selected reviews. Sustainability with eight, Journal of Cleaner Production with six, and Appetite and British Food Journal with five reviews stand out. Food system research with a focus on sustainability transition attracts a growing academic attention, as seen by this extensive involvement of journals with high disciplinary diversity.

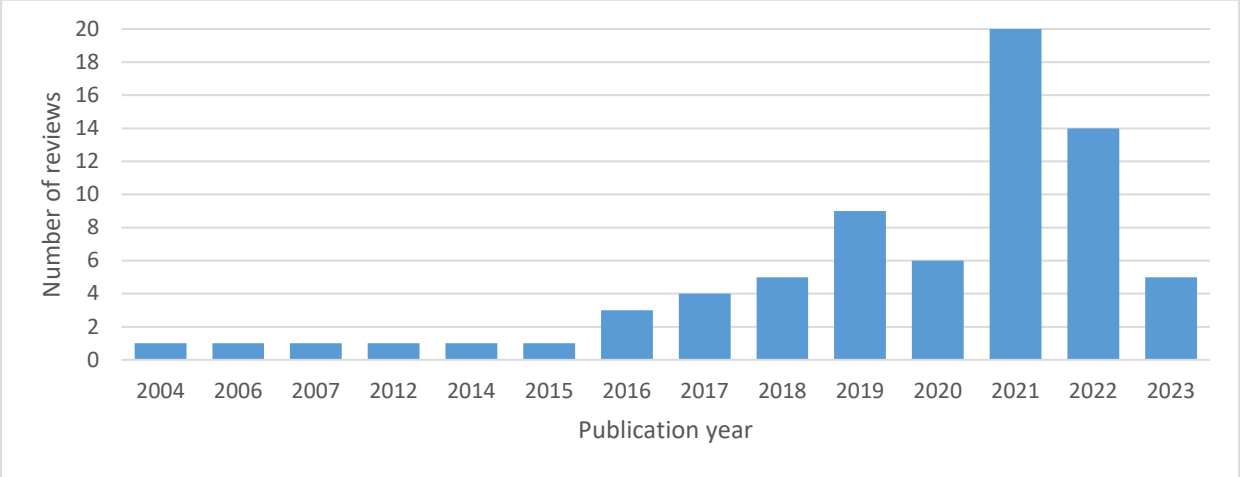


Figure 3 Selected reviews by year published

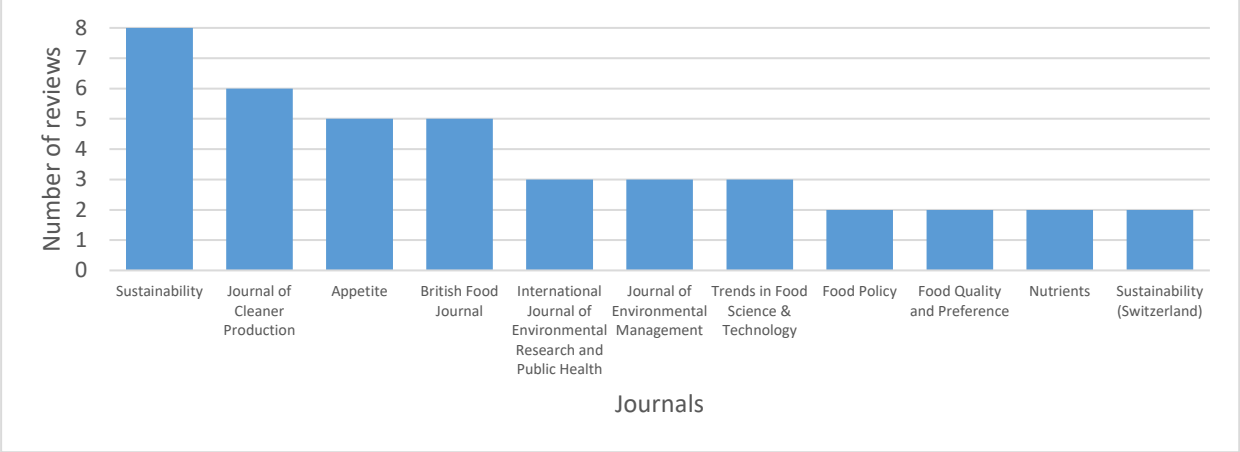


Figure 4 Selected Reviews by journals published in

This review also applied keyword co-occurrence analysis using the VOSViewer©[4] software. VOSviewer is widely used for exploring and visualizing maps created from bibliometric data. This is a common way of exploring patterns of relationships among selected publications in literature reviews. VOSViewer's keywords co-occurrence analysis identifies the keywords of the selected publications and their distribution in the form of clusters in the co-occurrence network. However, the quality of such analysis largely depends on the quality of keywords; therefore, it is recommended to clean keywords by looking for and filtering out synonyms or common terms. For that purpose, VOSViewer uses a thesaurus file with the list of original keywords and the list of keywords to replace original ones (Eck & Waltman, 2020). The copy of the thesaurus file created for this review is available in the Appendix (Table 8).

Keyword	Frequency	Keyword	Frequency	Keyword	Frequency
systematic literature review	17	consumers	5	acceptance	3
attitudes	14	consumption	5	environment	3
behaviors	13	experiment	5	farming	3
determinants	12	technologies	5	food waste reduction	3
food waste	12	willingness to pay	5	fruit	3
management	10	animal welfare	4	innovation	3
intentions	8	behavior change	4	livestock production	3
sustainability	8	consumer attitudes	4	meat consumption	3
adoption	7	consumer behavior	4	organic food	3
health	7	design	4	participation	3
perceptions	7	generation	4	planned behavior	3
reduction	7	information	4	shape abnormality	3
conservation agriculture	6	interventions	4	suboptimal food	3
farmers	6	labels	4	sustainable agriculture	3
circular economy	5	prevention	4	sustainable consumption	3
climate change	5	waste	4		
conservation	5	willingness	4		

Table 7 High-frequency keywords from the selected reviews

Figure 5 presents the result of the network visualisation of keywords co-occurrence analysis based on the 70 selected reviews. Keywords (the minimum number of occurrences was set to 3) are divided into four clusters. Although each cluster is closely interconnected suggesting that topic-oriented discourses conceptually overlap each other within behaviour focused food system research, the central position of Cluster 1 (yellow) suggests that this cluster illustrates the broad interpretation of the conceptual approach of the selected reviews. Clusters 2, 3, and 4 all illustrate a topic-oriented area in the literature reviewed. Clusters 2 (green) and 4 (red) focus on exploring two separate aspects of sustainable food consumption. The former recognises health, animal welfare, and quality dimensions associated with food consumption and purchase. The latter demonstrates the links between food consumption and food waste generation and prevention. Cluster 3 (blue) stands for the domain of sustainable farming and food production, wherein the adoption of conservation agriculture practices and management occupies a pivotal position.

[4] Source: https://www.vosviewer.com/

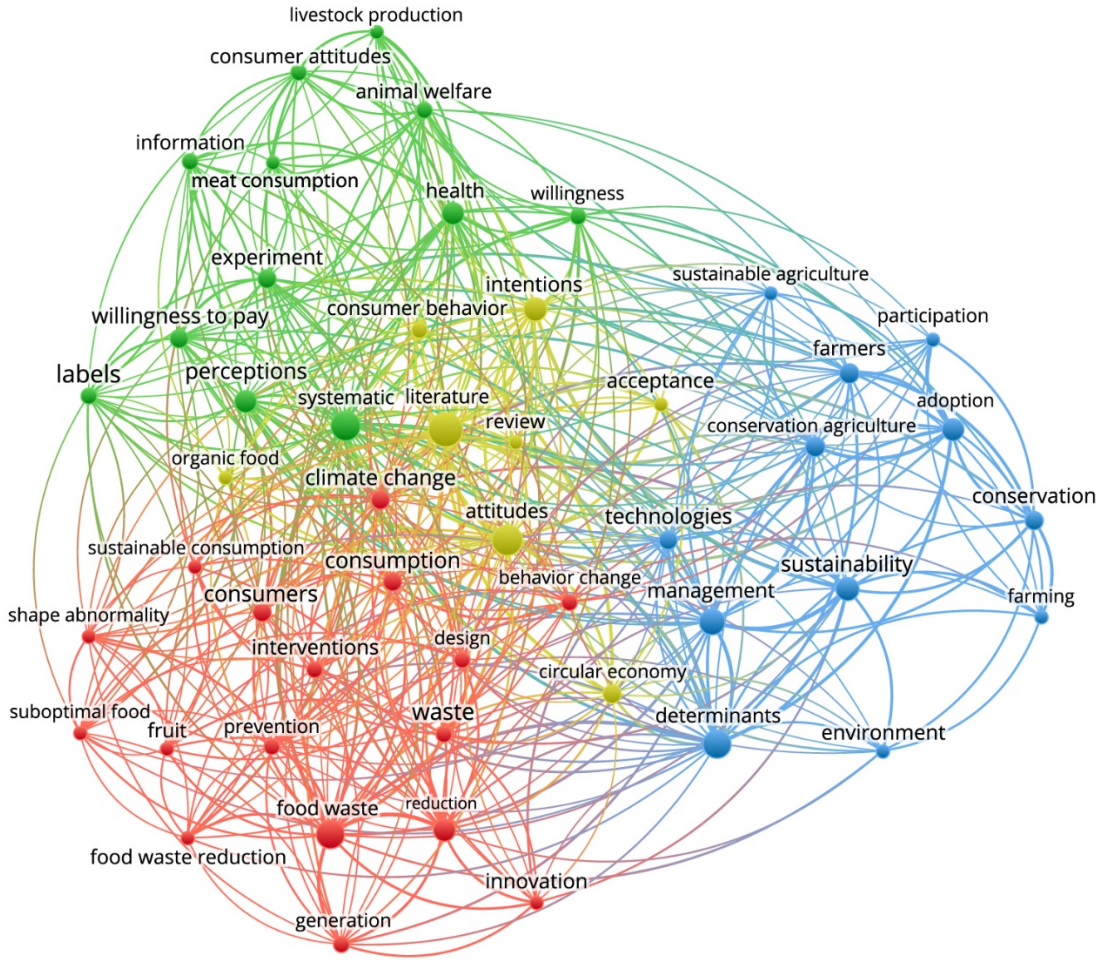


Figure 5 Network visualisation of keywords co-occurrence

3.1. 360° Reviews of factors influencing food system actors' behaviour

The primary results of this review are the so-called 360° reviews of behaviour-influencing factors. These sunburst charts were created to serve as informative, transparent, and functional maps. In that sense, these sunburst charts illustrate both the comprehensiveness of this review and the hierarchical structure of the factors being studied.

This deliverable provides four 360° reviews. The first one examines the behavioural determinants within the context of sustainable agriculture, whereas the second one focuses on sustainable food consumption. The latter one is further divided into three sub-domains: sustainable food consumption in general, organic food consumption and consumption of meat alternatives. Each 360° review is completed with a reference guiding table that links the appearances of every behaviour influencing factor to the references of the selected reviews, thus supporting factor-targeted searches between the large number of records included. This thematic division was justified in order to gain a more homogeneous understanding of the function of the factors. The reference guiding tables are included in the Appendix.

These reviews can be seen as comprehensive mas or inventories of behavioural factors. During coding the selected reviews, although an attempt was made, it proved unfeasible to further identify and record the direction of impact or the significance of each factor due to the frequent lack of clear information provided in the reviews. Moreover, it is important to note that the majority of factors

cannot be understood as solely one-dimensional source of impact, since hindering factors often possess the potential to be transformed into enabling ones in many instances. This is what is called the "*motivation-barrier continuum*" by Ranjan et al. (2019) and this approach is followed in the SAPEA (2023) report on sustainable food consumption. Ranjan et al. (2019) highlights that economic factors, social norms, perceptions of government programs, and farm characteristics are often regarded as sources of motivation and barriers to the adoption of conservation practices and programs. In the Whereas the SAPEA report, barriers and facilitators are seen as means to identify possible areas for intervention and policy development in order to promote sustainable and health-conscious food consumption. In that sense, barriers can be framed as facilitators and vice versa, depending on the context.

3.1.1. 360° Review of factors influencing the adoption sustainable farming

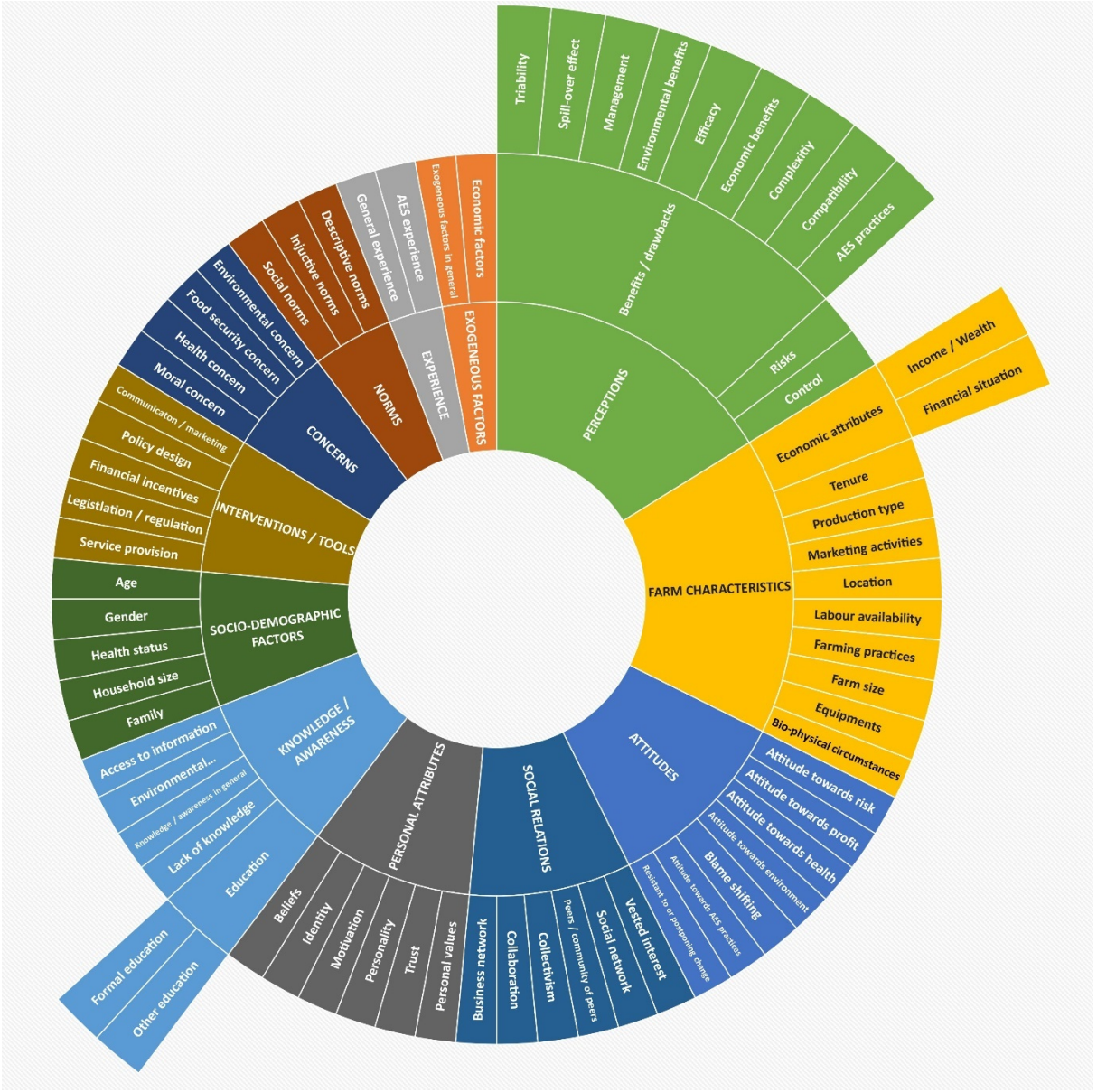
Factors influencing the adoption of sustainable farming were sought and explored by 21 reviews. These reviews collectively share a common research objective, which is to offer a cross-disciplinary portrayal of the factors that either incentivise or deter farmers in their engagement with sustainable agricultural practices (David et al., 2022; Foguesatto et al., 2020). Sociodemographic variables received extensive scholarly attention, however, Burton (2014) pointed out that these analyses mostly lacked the investigation of causality. In his article, Burton aspired to address this research gap. Rosario et al. (2022) concluded a similar hiatus regarding sociopsychological factors that shape farmers' decisions, motivating them to further investigate the topic.

Anibaldi et al., (2021) aimed to explore theory as an explanatory instrument within empirical research in their review of environmentally sustainable farming practice adoption. The aspirations of Baumgart-Getz et al. (2012) and Dessart et al. (2019) were directed towards delivering a quantitative synthesis of the literature concerning the adoption of Sustainable Agricultural Practices (SAP), along with an examination of the behavioural determinants shaping the decision-making processes involved. In addition, Dessart et al. (2019) aimed to develop a simple taxonomy of these determinants, with the subsequent intention of proposing policy recommendations fostering farmers' adoptions of SAPs. Broadening the adoption literature to developing countries was a primary goal of Tey et al. (2017), while Olum et al. (2020) observed both developed and developing countries in relation to farmers' innovation adoption. Conversely, Prokopy et al. (2019) and Ranjan et al. (2019) focused solely on the United States, aiming to summarise the conservation agriculture practice adoption literature. Bartowski and Bartke (2018) centred their research endeavours primarily on the European Union, with the principal goal of providing a multi-disciplinary examination encompassing empirical studies of farmers' decision-making processes related to soil management practices. Multiple studies had researched the implementation of SAPs, but literature on bundled SAPs was scarce. This knowledge gap was filled by Rajendran et al. (2016).

Sapbamrer and Thammachai (2021) directed their attention towards the domain of organic production, with their primary objective being the exploration of the determinants that impact the adoption of organic production practices. Almost two decades apart, Mercer (2004) and Low et al. (2023) both researched the literature of agroforestry adoption. Mercer (2004) applied a primarily economics-based approach, Low et al. (2023) scrutinised mixed farming and agroforestry systems from a value chain perspective. In his review, Bente Castro Campos (2022) delves into the prospective development of a new theory, the "Rules-Boundaries-Behaviour" framework explaining farmers' decision-making processes and the external factors shaping them.

The factors identified by these 21 reviews were grouped into 10 main categories, 53 parent subcategories and 20 child subcategories. These factors are presented by Figure 6. References categorised according to these factors are shown in Table 10 in the Appendix.

Figure 6 360° Review of factors influencing the adoption sustainable farming



3.1.2. 360° Review of factors influencing sustainable food consumption

Factors influencing sustainable food consumption were also sought and explored by 21 reviews. Similar to the previous section, we conducted an analysis of the research aims of these reviews focusing on the subject of consumer behaviour concerning sustainable food consumption. As the literature pertaining to consumers' preferences continues to expand, a systematic approach was imperative to synthesise prior research outcomes. Cecchini et al. (2018) undertook a comprehensive literature review, utilising studies employing experimental economic models. In order to enhance comprehension of the determinants and constraints associated with sustainable food consumption, Sánchez et al. (2021) examined articles centred on the dietary preference choices of university students.

Alternative staples can contribute to a more sustainable agricultural landscape. Consequently, Shah et al. (2021) researched consumers' receptivity towards grains such as rye, quinoa, and buckwheat in the existing literature. Within the research field of foodservice, Sullivan et al. (2021) sought to list strategies implemented by foodservice providers to enhance their sustainability, and to explore consumers' expectations towards these service providers.

Four reviewed articles analysed consumers' attitudes, perceptions and behaviour related to organic food consumption. Kushwah et al. (2019) sought to classify motives and barriers associated with organic food consumption by utilizing the theory of consumption values and the innovation resistance theory. Aschemann-Witzel and Zielke (2017) aimed to answer the importance of organic product prices and how they influence consumers' choices. In their article Katt and Meixner (2020) put forth the objective to provide an overview articles concerning consumers' willingness-to-pay (WTP) for organic food products, and to inform stakeholders (producers, retailers, etc.) about drivers influencing WTP. In their study, Roy et al. (2023) aimed to investigate the factors contributing to consumers' transition into regular organic consumers, delving into the exploration of the mediating influence of desire on attitudes and perceptions.

Sustainability labelling can have a significant impact on buying preferences, thus Tobi et al. (2019) explored the effect of labelling schemes in three distinct aspects: nutrition, environment, and social responsibility. Bastounis et al. (2021) conducted a comprehensive examination of the influence of eco-certification labels on willingness-to-pay (WTP), encompassing an assessment of various eco-label messages and formats. Additionally, the study explored the correlation between demographic variables and WTP.

The primary objective of the study conducted by Kowalsky et al. (2022) was the investigation of co-benefits pertaining to both dietary and environmental aspects. Conversely, the research undertaken by Hartmann et al. (2021) was centred on the exploration of drivers and barriers associated with the consumption of suboptimal foods[5], with an additional focus on strategies for their commercialisation.

A substantial portion of the reviewed articles addressed the subject of sustainable meat consumption. Valli et al. (2023) delved into finding out how consumer values affect their meat consumption, while Fonseca et al (2022) pursued to answer if consumers were willing to change their animal consumption because of animal welfare. Summarizing the factors presented in experimental studies influencing the choice of reduced meat consumption was a key goal for Harguess et al. (2020). Understanding the effect of environmental concern on attitudes towards meat consumption was the main goal of Sanchez-Sabate et al. (2019) and Sanchez-Sabate and Sabate (2019). The study undertaken by Kwasny

[5] Suboptimal food (SF) refers to food products that consumers perceive to have lower value compared to other items of the same type. This primarily pertains to products that are approaching their indicated expiration date, foods exhibiting variations in appearance, or packaging damage.

et al. (2022) was centred on the assessment of the efficacy of interventions designed to curtail meat consumption. Similarly, Grundy et al. (2022) conducted a meta-analysis, to obtain a broad understanding of the effectiveness of interventions influencing animal-product consumption.

The primary focus of the research conducted by Kouarfate et al. (2023) was to delve into consumers' attitudes encompassing cognitive, affective, and conative dimensions, along with their acceptance of cultured meat. On the account of meat alternatives, Onwezen et el. (2021) conducted an extensive overview of the latest findings of Western consumers' acceptance of alternative protein sources (such as pulses, insects, cultured meat, seaweed).

The results of these 21 reviews are shown in three figures. As mentioned above, there are three domain related sub-groups of factors within sustainable food consumption. Figure 7 presents the factors that influence the consumption of sustainable foods, Figure 8 the consumption of organic foods, and Figure 9 the consumption of meat alternatives. In that sense, these three figures together offer a comprehensive overview of all the factors that have been identified as important in explaining behavioural changes in the consumption of sustainable foods. There is also one reference guiding table for each sub-group: Table 11 includes factors for sustainable food consumption in general, Table 12 includes factors that have been identified as having an impact on organic food consumption, and Table 13 lists factors from reviews on alternative meat consumption. This thematic distinction is hoped to support a more efficient reference search.

Figure 7 360° Review of factors influencing the consumption of sustainable food

Figure 8 360° Review of factors influencing the consumption of organic food

Figure 9 360° Review of factors influencing the consumption of meat alternatives

4. Potential research agenda for food system-related sustainability research

This section aims to answer the second research question: *„What recommendations can be made for future research on sustainability transitions in agri-food systems (what remains unknown or under-studied in the discourse)?*" This section is synthesis based on the thematic content analysis of recommendation sections/ paragraphs of the selected reviews. This synthesis aims to outline a potential future narrative for research on the sustainable transition of food systems. This will be done by highlighting **common suggestions** and **identifying gaps in the literature**. The findings of this meta-analysis will be later transformed into a **potential research agenda (maybe potential research questions) as a contribution to the discourse on food system-related sustainability research**.

Due to substantial dissimilarities between the two groups of reviews (sustainable farming and sustainable food consumption), we analysed separately the recommendations presented in reviews addressing the subjects of farmers and customers' behaviour. Suggestions were grouped into the six following categories:

- **Further research questions:** Novel questions and topics arise, which authors identify for subsequent examination.
- **Suggested research methodology:** Specific research methodologies suggested by the authors for further examination.
- **Broadening scope:** Authors suggest widening the research scope to have a more accurate knowledge of the research field in question, or they propose to investigate the interrelatedness of other external factors that influence decision-making.
- **Behavioural research approach:** Researchers advocate to extend the usage of behavioural models in research.
- **Opening to other science disciplines:** Scholars advocate embracing alternative scientific disciplines such as social science and psychology, rather than exclusively scrutinizing the economic incentives underpinning the adoption of sustainable farming practices.
- **Warnings:** The authors caution against the pursuit of potential pitfalls which might lead to neglecting comprehensive consideration of other cardinal aspects.

4.1. Potential research agenda for sustainable agriculture

Thematic coding was conducted to obtain in-depth information about research suggestions and recommendations. Figure 10 shows the distribution of suggestions presented in the selected articles weighed by their occurrence.

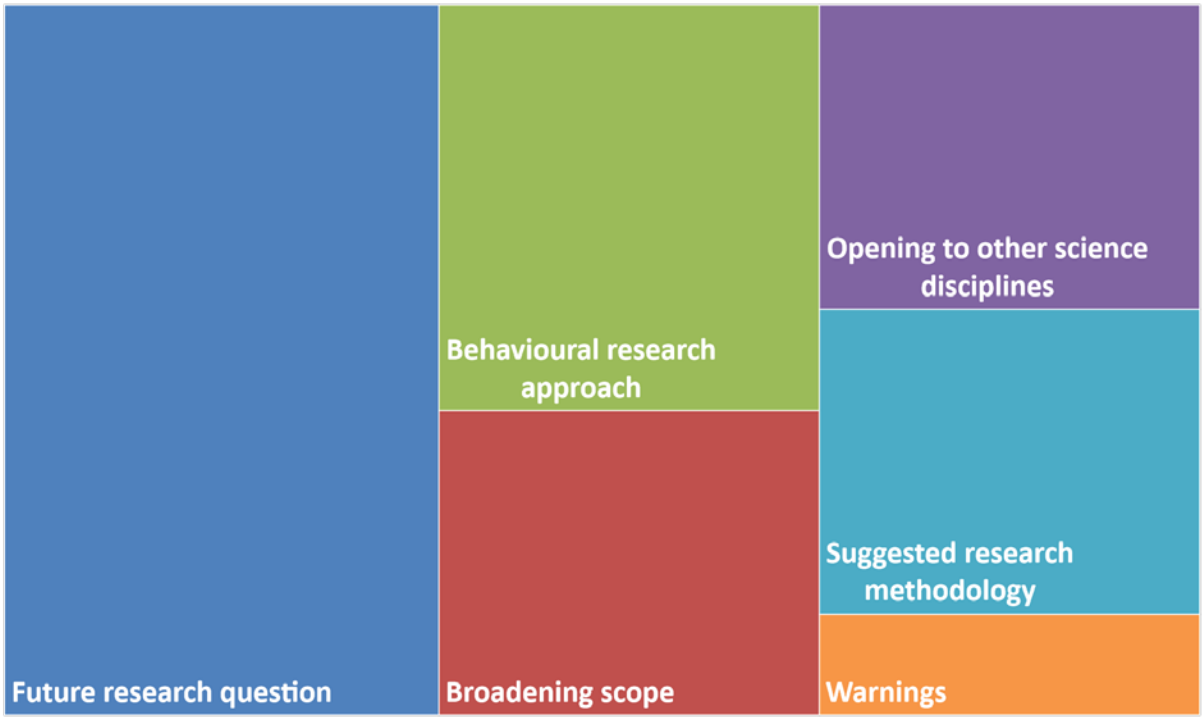


Figure 10 Recommendations in selected reviews on sustainable farming grouped by categories

1) ***Further research questions:*** Even though there is a growing pool of articles discussing farmers' motivations to adopt sustainable agricultural practices, authors still urge fellow researchers to further investigate the effect of farmers' identity (Prokopy et al., 2019) and the influence of their perceptions of risk and uncertainty (Mercer, 2004) on the willingness of adoption. Exploring the process that contributes to a farmer's decision-making in contemplating the potential for practice change emerges as a research endeavour worthy of in-depth investigation (Dessart et al., 2019). Prokopy et al. (2019) posit that it would be important to know how different messages of conservation practices reach farmers and what kind of impact they have on farmers' receptivity.

Socio-demographic factors – especially age – continue to wield a pivotal influence over decision-making processes, a significance that is poised to remain undiminished within this field of research. This pertinence is anticipated to endure, given the imminent prospect of substantial demographic changes within the farming population in the forthcoming decades, thereby establishing an enduring and continually relevant domain of study (Burton, 2014).

Bartowski and Bartke point out that it is essential to have a better understanding of the role of co-creation of credible partnerships, and the significance of advisory services (Bartkowski & Bartke, 2018). Farmers' attitudes toward their subsidy dependence are also suggested to be closely inspected (Bartkowski & Bartke, 2018). In accordance with the findings of Dessart et al. (2019), it is imperative for researchers to thoroughly examine the behavioural determinants that affect farmers' decisions when faced with mandatory and voluntary schemes. Moreover, in a European context, these behavioural factors should be evaluated in cross-culture studies to reach a better understanding of how different cultural backgrounds influence the adoption of sustainable farming practices (Dessart et al., 2019). Conversely, Knowler and Bradshaw (2007) contend that pursuing a wider scale may not necessarily yield a more precise understanding. Instead, they propose that researchers should focus on examining the adoption of conservation agriculture within specific localised contexts (Knowler & Bradshaw, 2007). This statement is further emphasised by David et al. (2022).

2) ***Suggested research methodology:*** Longitudinal examination is called for to obtain a better understanding of adaptation practices throughout a longer time frame (Anibaldi et al., 2021). Rosario

et al. (2022) concludes that utilising a sociopsychological model[6] is advised when assessing farmers' adaptation practices, but the authors call for a better method to compare the adoption practices of farmers from developed and developing countries (Rosario et al., 2022). David et al. (2022) advocates for research with a meta-analytical approach.

3) ***Broadening scope:*** Farming is not an activity disconnected from other activities and processes. Hence, it is important to encompass the viewpoints of stakeholders, this aspect may have been relatively underexplored in prior research (David et al., 2022). Dessart et al. (2019) also highlighted the interconnectedness of decision-making at a farm level, as farms are widely managed by families, they propose examination of group level decision making for further research.

4) ***Behavioural research approach*****:** Several authors concurred that it is important to analyse the effect of sociodemographic factors and the influence of farm characteristics, but it was also concluded that psychological factors should be included to attain a more nuanced comprehension of farmers' motivations (Foguesatto et al., 2020; Jones et al., 2020; Olum et al., 2020). Nevertheless, the concept of practice adoption exhibits a multifaceted nature, and prevailing behavioural theory models appear insufficient to encompass its entirety. "*Therefore, the emergence of models that are more specific to the contexts of adoption, as well as a combination of multi- and transdisciplinary models from economics, marketing, and sociopsychological models and their extensions, is increasingly recommended to explain the adoption of sustainable agricultural innovations*" (Rosario et al., 2022, p. 16).

5) ***Opening to other science disciplines*****:** Dessart et al. (2019) emphasise that a cross-disciplinary approach is a necessity for researchers if they would like to create a comprehensive overview of farmers' decision-making process in sustainable farming practice adoption. There are crucial economic, social and psychological aspects of this behaviour change. This statement finds reinforcement in the proposition put forth by Pannell et al. (2006), wherein emphasis is placed on the assertion that the adoption of conservation practices is contingent not solely upon biophysical factors but is also subject to the influence of the aforementioned facets.

6) **Warnings:** Pannell et al. (2006) caution biophysical scientists and fellow researchers to pay attention to those practices that a broad spectrum of landholders adopt. The authors highlight that these practices might yield more economic gains for owners and the adoption is largely independent of concerns surrounding environmental deterioration. This further underscores the proposition that the decision to adopt conservation practices is shaped by a multifaceted interplay of factors.

4.2. Potential research agenda for sustainable food consumption

Suggestions and recommendations in consumer articles were analysed in the same fashion as the articles about farmers decisions. Suggestions presented in the reviewed articles are shown in Figure 11. Each groups' relative size is based on their number of occurrences.

[6] For example the Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Values-Beliefs-Norms model (VBN), Stage of Change model (SOC) and Triggering Change model (TCM).

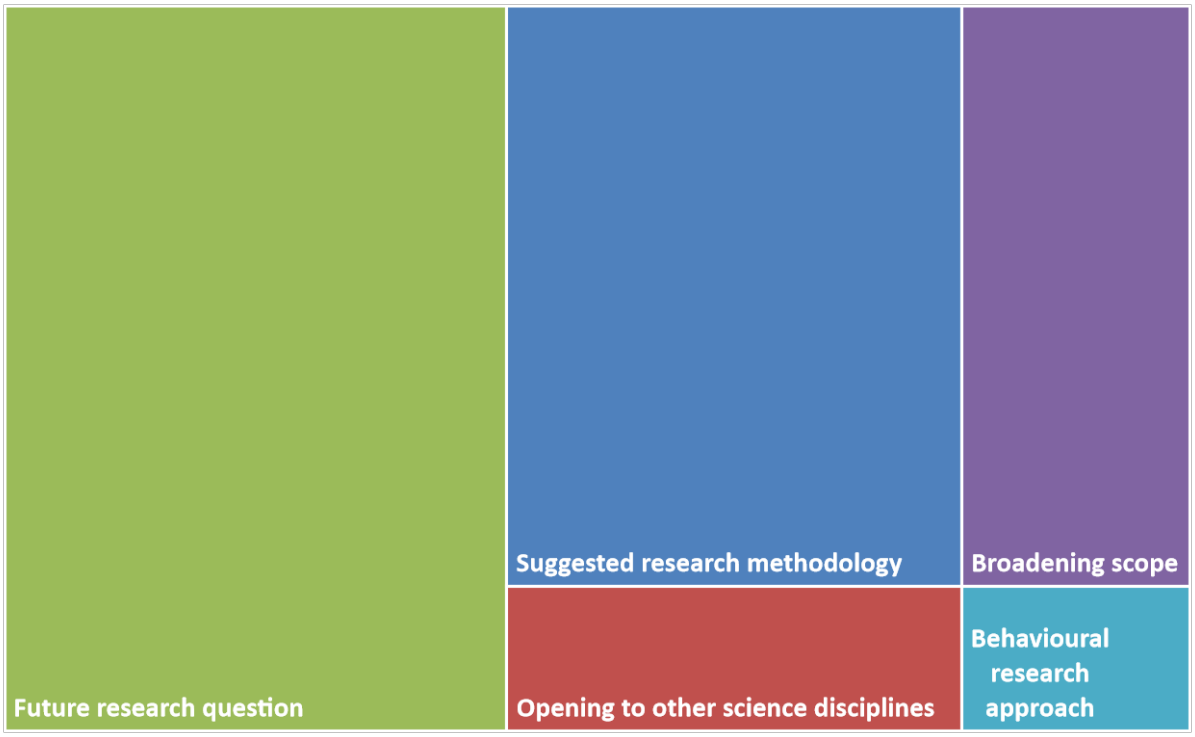


Figure 11 Recommendations in the selected reviews food consumption grouped by categories

1) ***Further research questions:*** The subject of Sustainable Food Consumption (SFC) has garnered extensive scholarly attention; however, the reviewed articles have indicated several areas that warrant further investigation. First of all, a better comprehension shall be obtained on how consumers' price perceptions influence the actual buying of a product, and how positive (e.g., good quality) and negative (e.g., too expensive) connotation of prices are weighed by consumers (Aschemann-Witzel & Zielke, 2017). In addition to prices, the impact of retail environments and e-commerce alternatives also presents a noteworthy avenue for scholarly inquiry (Aschemann-Witzel & Stangherlin, 2021; Katt & Meixner, 2020; Sanchez et al., 2021). Katt and Meixer (2020) advise fellow researchers to undertake an inquiry into the digitalisation of food supply chain and the influence of the growing level of transparency, particularly concerning their impacts on consumer behaviour.

Retailers and the accessibility of organic products exert a significant influence on consumer behaviour. Roy et al. (2023) propose, that forthcoming research on organic food consumption should encompass an examination of product availability even within geographically remote areas (Roy et al., 2023). The availability of sustainable food products has been recurrently raised within researchers. A particularly intriguing proposition is to analyse different types of food products in shaping consumption patterns. Aschemann-Witzel and Zielke (2017) propose that peer researchers scrutinise the effect of local and healthy food products on the buying rate of organic goods. The impact of framing sustainable food products as healthy and environmentally pro-social might also pose a new research topic worth delving into (Sanchez et al., 2021). Sanchez et al. (2021) also suggest to investigate the influence different eco-labels have on consumers' buying behaviour, as well as situational factors such as time pressure, portion size and palatability.

Lastly, meat consumption and meat alternatives open a distinct field of research. Researchers should consider the gastronomic and hedonistic dimensions of consumption, while consumers ability to prepare meat alternatives is also a crucial aspect of their usage (Sanchez-Sabate & Sabate, 2019).

The literature of consumption behaviour of sustainable food products would benefit from further research of consumers' willingness to change their meat buying habits (Valli et al., 2023) and the exploration of how occasional buyers become regular consumers (Aschemann-Witzel & Zielke, 2017).

2) ***Suggested research methodology:*** Four reviewed articles propose that future investigations conduct research in real-life settings, as answers to hypothetical questions in surveys and interviews are less accurate representations of actual behaviour (Cecchini et al., 2018; Harguess et al., 2020; Hartmann et al., 2021; Katt & Meixner, 2020). A comparative analysis across multiple drivers of alternative protein consumption is called for (Onwezen et al., 2021), while a longitudinal methodology would also be well-received for the purpose of eliciting insights into consumers' preferences over an extended time frame (Cecchini et al., 2018). One article posits the notion of undertaking quantitative syntheses to compile interventions that exert an influence on the consumption of animal products beyond meat (Grundy et al., 2022). Lastly, Aschemann-Witzel and Zielke (2017) suggest differentiation between regular and occasional buyers to have a more detailed picture of consumption drivers between different consumer types.

3) ***Broadening scope:*** Future research should consider broadening their geographical scope to multiple countries (Cecchini et al., 2018), advanced and developing economies ought to be equally represented in further analyses to explore disparities in consumers behaviour of buying organic food in diverse contexts (Katt & Meixner, 2020). Hartmann et al. (2021) suggest the analysis of the whole value chain to acquire better knowledge on the consumption of suboptimal food products. Finally, Sullivan et al. (2021) propose that fellow researchers should delve into the green foodservice initiatives in general and should observe operations not directly related to food consumption (e.g., solar panels/energy usage).

4) ***Opening to other science disciplines*****:** The intricate landscape of behaviour change, encompassing supplementary facets like habits, external elements of the food environment, and the efficacy of interventions, necessitates a comprehensive approach that integrates multiple academic disciplines concurrently (Kwasny et al., 2022). Aschemann-Witzel and Zielke (2017) emphasise the importance of combining sociodemographic and psychological variables in inquiring about consumers' behaviour.

5) ***Behavioural research approach*****:** A more advanced use of behavioural change theories is called for in future research of people's sustainable diet preferences (Tobi et al., 2019).

4.3. Potential research agenda for food supply chains

In the subsequent section, we provide an overview of reviews addressing the subject of food supply chains. Altogether we identified 8 reviews addressing this topic (See Table 9). Applying interdisciplinary lens, Sovacool et al. (2021) examined the possibilities of decarbonising the food and beverage system in their review. The review delves into the details of the benefits (energy, carbon and cost savings, health, and environmental benefits) and barriers (financial, economic, institutional, managerial, and behavioural barriers) of the sector's decarbonization. Dania et al. (2018) sought to address the most important and distinct collaboration behaviour factors that influence actors in the agri-food supply chain. In doing so, the authors aspired to provide a comprehensive synthesis of these factors and discern the essential elements underpinning effective supply chain collaboration. Their objective encompassed identifying similarities that exist among these factors. Fraser et al. (2016) had the ambition to research controversial topics in the food supply chain that are present today. They aimed to provide a better understanding of both sides of the reviewed debates (e.g., production of GM foods, lowering the impact of agriculture on the environment while ensuring food security for a growing population). For a detailed picture, the authors analysed primary studies in four aspects: *"(1) technology to increase food production; (2) equitable food distribution; (3) policies to reduce pollution and waste; and (4) community action to promote sovereign food systems*" (Fraser et al., 2016, p. 79). Tian and Kamran (2021) investigated background factors and their effects on loyalty in the context of food marketing with a special focus on sustainability. The authors aimed to provide detailed explanations of consumers' loyalty dimensions, thus informing retailers, policymakers, manufacturers, and producers. The effectiveness of green nudging and its ability to influence supply-chain actors'

behaviour was researched by Ferrari et al. (2019). In their review, the authors wished to provide an overview of the most influential nudging interventions. Rathgens et al. (2020) pose that the literature on alternative trade arrangements is highly fragmented, no previous articles attempted to synthesise the different findings and explore possibilities of cross-fertilization. Local food supply chains are also investigated by two reviews. Feldman and Hamm (2015) applied the Alphabet Theory to examine consumers' perceptions on local food, while Freedman et al. (2016) inspected drivers and barriers in relation to visiting farmers' markets.

Similarly, to the previous two sections on farming and consumption, we summarised and synthesised the suggestions and recommendations for future research from the food supply chain-related reviews.

Future research question: Six articles contained suggestions for future research questions. Sovacool et al. (2021) pose four areas where future research might be needed. Firstly, the authors suggest that mapping both the costs and benefits of decarbonisation of the whole system of the food and beverage industry is much requested. Similarly, the authors believe that crosscutting solutions in the whole supply chain should be investigated. Sovacool and colleagues encourage the adoption of a holistic approach that considers transportation, distribution, packaging, and waste management at the same time to obtain comprehensive results of the environmental impact of food production and consumption. Moreover, the impact of COVID-19 was measurable in the food and beverage industry which opened a new research field, consequently, the authors suggest that peer researchers examine the pandemic's long-term effects.

Dania et al. (2018) advise researching the collaboration behaviour factors among agri-food supply chain actors to generate more accurate knowledge and to investigate the relationship between the different factors that influence decision-making.
Feldmann and Hamm (2015) argue that future researchers should consider delving into the examination of contextual factors and their effects on consumer behaviour, and at the same time, they should pay attention to the validation of these factors.

According to Rathgens et al. (2020), further investigation would benefit from focusing on the background factors influencing consumers' and producers' (especially smallholders) perceptions and behaviour towards alternative trade arrangements. They add that exploring the interconnectedness of social and ecological factors can lead to a better comprehension of farmers' behaviour related to land use intensification. Tian and Kamran (2021) advise the exploration of the relationship between customer satisfaction and sustainability marketing. They believe that researching consumer values, loyalty, and corporate social responsibility (CSR) related to food retailers is important in filling current knowledge gaps. They also recommend the development of a comprehensive framework, incorporating new variables based on sustainability values (Tian & Kamran, 2021).

After synthesising the literature on the effect of nudging in improving the environmental impact of the food system, Ferrari, et al. (2019) encourage researchers to further investigate if nudges can induce long-term and stable behaviour change, or if they are only effective in exploiting individuals' cognitive biases without fostering an environmentally friendly behaviour.

Broadening scope: Freedman et al. (2016) outline two recommendations: firstly, studies should encompass cultural diversity and investigate consumers' access to farmers' markets; secondly, they encourage fellow researchers to delve into the attitudes of economically disadvantaged consumers towards farmers' markets. Feldman and Hamm (2015) also advocate for more culturally diverse research that includes different countries as sociocultural factors might influence attitudes and behaviour differently. Lastly, Sovacool et al. (2021) also encourage peers to examine food system decarbonisation options in non-Western societies and illiberal states as well.

Suggested research methodology: It is recommended to consider applying an Organisational Theory lens "*such as Stakeholder Theory, Complexity Theory or Transactional Cost Economics can be applied, and then have the results compared from different perspectives, which can extend the current study and better inform knowledge and decision-making on supply chain collaboration behaviour"* (Dania et al., 2018, p. 862).

5. Concluding remarks

This review aimed to map the factors that hinder or facilitate the behavioural change of food system actors by conducting an umbrella mapping review of systematic literature reviews from food system research. The most noticeable finding of this comprehensive and unprecedented work is the unbalanced characteristic of food system research: the scientific literature on the behaviour of food system actors has largely concentrated on farmers and consumers. Among the 70 systematic reviews included in this review, 21 of them delve into the domain of sustainable farming, while an additional 21 reviews focus on sustainable food consumption. The remaining reviews are related to three other domains: food waste, the food supply chain, and the circular food system.

This review, in line with the VISIONARY project's theoretical and conceptual foundations outlined in its Initial Conceptual Framework, conducted a targeted analysis of the farming- and consumption-oriented reviews. This resulted in two comprehensive maps of factors. These factors have been identified as influencing farmers' and consumers' behaviour in the context of sustainable transition. These maps and the attached reference guiding tables will fulfil their primary function when VISIONARY case studies seek guidance in the pertinent literature. However, this structured collection and presentation of behavioural factors may support other research endeavours undertaken in food system research.

To conclude the narrative analysis of the reviewed literature, we posit that forthcoming research endeavours concerning the decision-making processes of both farmers, consumers, and food supply chains would greatly benefit from the application of a holistic approach. Decision-making depends on a multitude of factors, both internal (perceptions, attitudes, subjective norms, knowledge, habits, etc.) and external (available possibilities, financial circumstances, cultural context, environmental conditions, etc.). Considering this, we recommend that future research adopts conceptual frameworks that integrate these diverse dimensions, thereby facilitating the attainment of findings that mirror real-life decision-making processes. Observing the influence and interrelatedness of value chain actors might also be a subject for further investigation. Consumers' buying preferences clearly influence the demand for sustainable food products, but processing capacity and capability, and retailers' storage logistics also impact the production and availability of sustainable food products. We suggest creating and delving into these future narratives in more detail.

The main component of VISIONARY's endeavour is represented by 28 case studies, which are grouped into eight thematic clusters. These clusters will primarily address the thematic diversity and cross-disciplinarity reflected in the results of this review. With these eight thematic clusters, the project places specific emphasis on the following food system transitions: 1) organic farming, 2) sustainable food consumption, 3) food retailing, 4) sustainable food value chain initiatives, 5) plant-based protein systems, 6) biodiversity-friendly farming, 7) carbon-neutral food production, and 8) sustainable water management. The detailed mapping of the contributions of VISIOANRY case studies will be available in Deliverable 2.2 (Mapping contribution of selected case studies to VISIONARY) to be released by Month 13. VISIONARY case studies will approach these transitions through different lenses and with different methods, while using this review as a source of information and inspiration to contribute our better understanding of sustainability transitions in agri-food systems.

6. Limitations

It is important to acknowledge that this review has certain limitations. Regarding the search strategy, there were only two bibliographic databases involved; however, there are other scientific databases that could have potentially increased the number of retrieved records. Selection bias might have also been introduced by the fact that this review did not include grey literature. An additional potential source of selection bias could be attributed to the absence of double screening during the full-text screening phase. Information bias can occur during the process of retrieving and coding information from the selected records. In this case, coding proved to be particularly challenging because, in each review, the authors first had to break down an existing structure of factors into codes and later restructure and merge them with other factors from other reviews. Publication bias also should be considered because this review largely depends on the methods used within the selected reviews. Inevitably, any bias or methodological flaw has been carried over into this review. Also noteworthy is that overlapping studies and cross-citations among the selected reviews were not addressed in this review.

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8. Appendix

Table 8 Thesaurus file for VOSViewer

Label	Replace by	Label	Replace by
acceptance	acceptance	innovation adoption	innovation adoption
additionality		integrated analysis	integrated analysis
adopt insects	adopt insects	intensification	intensification
adoption	adoption	intention	intentions
adoption decisions	adoption	intentions	intentions
agricultural bmp	agricultural bmp	interface	interface
agricultural innovations	agricultural innovations	international-trade	international-trade
agricultural practices	farming	interventions	interventions
agricultural sustainability	agricultural sustainability	intrinsic motivations	intrinsic motivations
agricultural systems	agricultural systems	in-vitro meat	cultured meat
agriculture	agriculture	italian youths	
agri-environment	agri-environment	kolli hills	
agri-environmental measures	agri-environmental measures	lab	lab
agri-environmental schemes	agri-environmental measures	land	land
agri-food	agri-food	land management	land management
agrifood supply chain	agrifood supply chain	leftovers	leftovers
agri-food supply chain	agrifood supply chain	lessons	
agroforestry innovations	agroforestry innovations	life-style	life-style
alphabet theory	alphabet theory	livelihood assets	livelihood assets
alternative staples	alternative staples	livelihood impacts	livelihood impacts
alternative trade arrangements	alternative trade arrangements	livestock production	livestock production
ambivalence	ambivalence	local food	local food
anaerobic-digestion	anaerobic-digestion	management	management
animal suffering	animal suffering	management practice	management
animal welfare	animal welfare	management practice adoption	management practice adoption
animals		management-practices	management
animal-welfare	animal welfare	market	market
animal-welfare programs	animal welfare programs	matters	
attitude	attitudes	meat	meat
attitudes	attitudes	meat avoiders	meat avoiders
auction	auctions	meat consumption	meat consumption
auctions	auctions	meat reducers	meat reducers
awareness	awareness	mental-health	mental-health
barriers	determinants	meso-level	meso-level
behavior	behaviors	metaanalysis	systematic literature review
behavior change	behavior change	mixed methods	mixed methods

Label	Replace by	Label	Replace by
behavior interventions	behavior interventions	model	model
behavioral loyalty	behavioral loyalty	monitoring and evaluation	monitoring and evaluation
behavioral reasoning theory	behavioral reasoning theory	mortality	mortality
behaviors	behaviors	motivation	motivation
behaviour	behaviors	multiethnic workers	multiethnic workers
behaviour change	behavior change	multi-level framework	multi-level framework
behavioural models	behavioural models	networks	networks
beliefs	beliefs	net-zero	net-zero
best practices	best practices	norms	norms
bibliographic analysis	systematic literature review	nudge	nudges
biodiversity	biodiversity	nudges	nudges
bio-economy	bio-economy	nutrition	nutrition
brand loyalty	brand loyalty	nutritional-status	nutrition
bread	bread	organic farming	organic farming
bundled sustainable agricultural practices	sustainable agriculture	organic food	organic food
business models	business models	organic marketing	organic marketing
buy		participation	participation
california		participatory research	participatory research
campaign		payments for environmental services	payments for environmental services
carbon footprint	carbon footprint	perceived naturalness	perceived naturalness
certification	certification	perception	perceptions
challenges	challenges	perceptions	perceptions
choice	choices	performance	performance
choice experiment	experiment	perishable food	perishable food
choices	choices	perspective	perspective
circular economy	circular economy	pes schemes	
circular food behavior	circular food behavior	pest-management	pest-management
citizens	citizens	planetary health	planetary health
climate	climate	planned behavior	planned behavior
climate change	climate change	plant-based diets	plant-based diets
climate mitigation	climate mitigation	plate	plate
climate-change	climate change	plate waste	food waste
coffee certification		policy	policy
collaboration behavioural factors	collaboration behavioural factors	policy and practice implications	policy and practice implications
collaboration performance	collaboration performance	practice theory	practice theory
college-students	college-students	preferences	preferences
colorectal-cancer survivors	colorectal-cancer survivors	premium	premium
conceptual map	conceptual map	prevention	prevention
concerns	concerns	private	private
conservation	conservation	product attributes	product attributes

Label	Replace by	Label	Replace by
conservation agriculture	conservation agriculture	products	products
conservation practices	conservation agriculture	pro-environmental behaviour	pro-environmental behaviour
conservation practices and programs	conservation agriculture	programs	programs
consumer	consumers	protein	protein
consumer acceptance	consumer acceptance	protein consumption	protein consumption
consumer attitude	consumer attitudes	provision	provision
consumer attitudes	consumer attitudes	public-attitudes	public-attitudes
consumer behavior	consumer behavior	purchase	purchase
consumer behaviour	consumer behavior	purchase intention	intentions
consumer food waste	consumer food waste behavior	purchase intentions	intentions
consumer food waste behavior	consumer food waste behavior	qfd approach	qfd approach
consumer waste	consumer waste	qualitative synthesis	qualitative synthesis
consumer-behavior	consumer behavior	quantification	quantification
consumers	consumers	quantities	quantities
consumers attitudes	consumers attitudes	radical innovation	radical innovation
consumption	consumption	randomized controlled-trial	experiment
contentious farming	contentious farming	randomized-trial	experiment
conversion	conservation agriculture	rbb framework	rbb framework
cooking	cooking	recycled water	recycled water
corporate social responsibility	corporate social responsibility	reduce	reduction
corporate social-responsibility	corporate social responsibility	reduction	reduction
cultured meat	cultured meat	reduction of food waste	food waste reduction
customer loyalty	customer loyalty	relationship quality	relationship quality
date labels	labels	resilience	resilience
decision-making	decision-making	resource dependence theory	resource dependence theory
decisions	decisions	restaurant	restaurant
deficit model	deficit model	retail	retail
demand		revealed preferences	revealed preferences
design	design	rice	
determinant factors	determinants	satisfaction	satisfaction
determinants	determinants	semi-systematic review	systematic literature review
developed countries		sensory appeal	sensory appeal
developing countries		sensory characteristics	sensory characteristics
dietary change	dietary change	service quality	service quality
diets	diets	services	services
dissociation	dissociation	shape abnormality	shape abnormality
downstream food supply chain	downstream food supply chain	slr	
drivers	determinants	smallholder farmers	smallholder farmers
eat less meat	eat less meat	small-scale farmers	smallholder farmers

Label	Replace by	Label	Replace by
eat meat	meat eating	social acceptability	social acceptability
ecology	ecology	social ecology	social ecology
economic valuation	economic valuation	social indicators	social indicators
economy practices	economy practices	social media	social media
edible insects	edible insects	social sustainability	social sustainability
electrolyzed water	electrolyzed water	social-change	social-change
emerging country		social-desirability bias	social-desirability bias
enablers	determinants	social-exchange	social-exchange
energy policy	energy policy	social-responsibility	social-responsibility
energy recovery	energy recovery	socio-cultural	socio-cultural
entomophagy	entomophagy	soil conservation	conservation agriculture
environment	environment	soil fertility	soil fertility
environmental beliefs	environmental beliefs	solid-waste	solid-waste
environmental concerns	environmental concerns	soy food-consumption	soy food-consumption
environmental impacts	environmental impacts	stakeholders' perspectives	stakeholders' perspectives
environmental services	environmental services	storage	storage
environmental sustainability	environmental sustainability	store loyalty	store loyalty
environments	environment	suboptimal food	suboptimal food
ethics	ethics	substitute	substitute
experiment	experiment	supermarket	supermarket
expiration date	expiration date	supply chain	supply chain
extrinsic motivations	extrinsic motivations	surgical castration	
fairtrade	fairtrade	sustainability	sustainability
fair-trade	fairtrade	sustainability labels	labels
farmer behaviour	farmer behaviour	sustainability science	sustainability science
farmers	farmers	sustainability transitions	sustainability transitions
farming	farming	sustainable agricultural practices	sustainable agriculture
farming practice	farming	sustainable agriculture	sustainable agriculture
farmland	land	sustainable consumption	sustainable consumption
finnish households		sustainable development	sustainable development
flexitarian flip(tm)	flexitarian flip(tm)	sustainable diets	sustainable diets
food	food	sustainable food consumption	sustainable food consumption
food and drinks	food and drinks	sustainable food waste management	sustainable food waste management
food behaviour	food behaviour	sustainable supply chain	sustainable supply chain
food choice	food choice	system	systems
food innovations	food innovations	systematic literature review	systematic literature review
food loss and waste (flw)	food waste	systematic review	systematic literature review
food manufacturing	food manufacturing	systems	systems
food policy	food policy	tam	
food practices	food practices	technologies	technologies
food preferences	food preferences	technology	technologies

Label	Replace by	Label	Replace by
food processing	food processing	technology adoption	technologies
food retailing	food retailing	thailand	
food sector	food sector	theory	theory
food systems	food systems	things	things
food waste	food waste	tipping points	tipping points
food waste barriers	determinants	tool	tool
food waste drivers	determinants	to-pay	
food waste reduction	food waste reduction	tpb	
foodservice	foodservice	triple bottom line	
forest conservation	forest conservation	trust	trust
framework		understanding farmers	
fruit	fruit	united states	
future		united-states	
generation	generation	university students	university students
germany		upcycling	upcycling
global warming	climate change	valorisation	upcycling
globalization	globalization	valuation	valuation
governance	governance	values	values
green	green	values and preferences	values and preferences
green products	green products	vegetable	vegetables
habits	habits	vegetable farmers	farmers
health	health	vegetables	vegetables
health and wellbeing	health	vegetarian	vegetarian
health behaviour	health behaviour	voluntary	voluntary
healthy	healthy	waste	waste
healthy directions	healthy directions	waste behavior	waste behavior
heat-recovery	heat-recovery	waste management	waste management
hospitality and food services sector	hospitality and food services sector	waste management technology	waste management technology
household	household	waste prevention	waste prevention
household behaviour	household behaviour	waste reduction	waste reduction
household food waste	household food waste	wasteful behaviour	wasteful behaviour
household waste	household waste	waste-to-value	waste-to-value
household-level	household-level	water	water
human dimension	human dimension	water demand	water demand
human health	health	water quality	water quality
husbandry	husbandry	welfare	welfare
hydrological services	hydrological services	willingness	willingness
impact	impact	willingness to accept	willingness to accept
implementation	implementation	willingness to pay	willingness to pay
incentive-based conservation	incentive-based conservation	willingness to pay (wtp)	willingness to pay
incentives	incentives	willingness-to-pay	willingness to pay
increase fruit	increase fruit	working-class	working-class
index-insurance	index-insurance	young adults	young adults
industrial decarbonization	industrial decarbonization	young consumers	young consumers

Label	Replace by	Label	Replace by
industry	industry	young people	young people
information	information	young-adults	young adults

Table 9 Summary of selected reviews[7]

	Author(s)	Food system themes	Review type	Nr of studies reviewed	Bibliographic databases / Search platforms	Time range
1	(Kowalsky et al., 2022)	SFC	systematic literature review	21	PubMed; Cinahl; Scopus; Trip;	2013 to 2020
2	(Grundy et al., 2022)	SFC	meta review	18	Medline; Scopus; PsycINFO (Ovid); Web of Science; Proquest Dissertations and Theses;	1990 to 2020
3	(Katt & Meixner, 2020)	SFC	systematic literature review	138	Google Scholar; EBSCO; ScienceDirect; SCOPUS; Wiley Online Library;	1999 to 2019
4	(Aschemann-Witzel & Zielke, 2017)	SFC	structured literature review	83	Organic Eprints; Science Direct; Business Source Complete; ABI Inform; Web of Science;	2000 to 2014
5	(Kwasny et al., 2022)	SFC	systematic literature review	67	Web of Science; Science Direct; SCOPUS;	2001 to 2019
6	(Hartmann et al., 2021)	SFC	systematic literature review	40	Web of Science; Science Direc;	2004 to 2019
7	(Kushwah et al., 2019)	SFC	systematic literature review	89	Web of Science; SCOPUS; Organic Eprints; EBSCO; Emerald; Elsevier; Wiley; Wiley; Taylor & Francis; Springer;	2005 to 2018
8	(Cecchini et al., 2018)	SFC	systematic literature review	41	Business Source Complete; Science Direct; Google Scholar;	2006 to 2017
9	(Roy et al., 2023)	SFC	structured literature review	50	Google Scholar; Scopus;	2010 to 2022
10	(Fonseca & Sanchez-Sabate, 2022)	SFC	systematic literature review	79	Web of Science;	uo to 2022
11	(Kouarfate & Durif, 2023)	SFC	systematic literature review	86	Sofia;	up to 2022
12	(Onwezen et al., 2021)	SFC	systematic literature review	91	Scopus;	up to 2020
13	(Sanchez et al., 2021)	SFC	systematic literature review	40	Medline; Embase; PsycInfo; Web of Science; Scopus; LILACS databases; Google Scholar ; Google Scholar	up to 2021
14	(Sanchez-Sabate et al., 2019)	SFC	systematic literature review	4	Web of Science;	up to 2018
15	(Harguess et al., 2020)	SFC	systematic and configurative literature review	22	Web of Science; PubMed; PsycInfo; ProQuest;	up to 2018
16	(Sanchez-Sabate & Sabate, 2019)	SFC	systematic literature review	14	Web of Science;	up to 2018
17	(Bastounis et al., 2021)	SFC	systematic literature review	43	EMBASE; MEDLINE; PsycINFO; Social Science Citation Index (SSCI); CAB Abstracts;Cochrane Controlled Register of Trials (CENTRAL); Cochrane Database; Cochrane Database;	up to 2019
18	(Sullivan et al., 2021)	SFC	systematic literature review	34	MEDLINE; EMABASE; CINAHL; Web of Science;	up to 2019
19	(Tobi et al., 2019)	SFC	systematic literature review	30	Global Health; Web of Science and PubMed; GreenFILE; ABI Inform; PsychINFO;	up to 2019
20	(Shah et al., 2021)	SFC	systematic literature review	81	Scopus; Web of Science;	up to 2020
21	(Valli et al., 2023)	SFC	mixed-methods systematic review of literature	70	MEDLINE ; EMBASE ; Web of Science; CAB abstracts; AGRIS; FSTA	up to 2020
22	(Rosario et al., 2022)	SF	systematic literature review	866	Web of Science; Scopus;	2000 to 2009 and

[7] SFC – sustainable food consumption; SF – sustainable farming; FW – food waste; FSC – food supply chain; CFS – circular food system

	Author(s)	Food system themes	Review type	Nr of studies reviewed	Bibliographic databases / Search platforms	Time range
						from 2010 to 2021
23	(Baumgart-Getz et al., 2012)	SF	meta analysis	46	not available;	1982 to 2007
24	(Prokopy et al., 2019)	SF	systematic literature review	172	Web of Science; SCOPUS;	1982 to 2017
25	(Campos, 2022)	SF	systematic literature review	48	Web of Scienece; unpublished bachelor thesis;	1995 to 2021
26	(Ranjan et al., 2019)	SF	systematic literature review	49	Web of Science; SCOPUS;	1996 to 2017
27	(Tey et al., 2017)	SF	structured literature review	31	Scopus; Google Scholar;	1999 to 2012
28	(Sapbamrer & Thammachai, 2021)	SF	systematic literature review	50	Web of Science; Scopus; PubMed; Google Scholar; Google;	1999 to 2021
29	(Mills et al., 2021)	SF	systematic literature review	122	Web of Science; Google Scholar;	2000 to 2018
30	(Anibaldi et al., 2021)	SF	systematic literature review	75	EBSCO All Databases; Emerald; ProQuest All Databases; Ovid All Databases; Web of Science; Scopus;	2014 to 2018
31	(David et al., 2022)	SF	systematic literature review	363	EBSCO All Databases; Emerald; ProQuest All Databases; Ovid All Databases; Web of Science; Scopus;	2014 to 2018
32	(Burton, 2014)	SF	structured literature review	53	Scopus; Web of Knowledge; JSTOR;	not available
33	(Knowler & Bradshaw, 2007)	SF	structured literature review	31	not available	not available
34	(Pannell et al., 2006)	SF	structured literature review	not available	not available	not available
35	(Dessart et al., 2019)	SF	structured literature review	not available	not available;	1999 - 2019
36	(Mercer, 2004)	SF	structured literature review	not available	not available;	not available
37	(Foguesatto et al., 2020)	SF	structured literature review	305	AgEcon Search; Google Scholar; Scopus; Web of Science;	2007 to 2018
38	(Rajendran et al., 2016)	SF	systematic literature review	24	Scopus; Google Scholar; references listed in selected journals;	up to 2014
39	(Bartkowski & Bartke, 2018)	SF	systematic literature review	87	Web of Science;	up to 2017
40	(Jones et al., 2020)	SF	systematic literature review	78	Web of Science; CAB Abstract ;	up to 2018
41	(Olum et al., 2020)	SF	systematic literature review	80	Web of Science;	up to 2019
42	(Low et al., 2023)	SF	systematic literature review	80	Scopus;	up to 2022
43	(Oláh et al., 2022)	FW	structured literature review	2921	Web of Science; Scopus;	1975 to 2012
44	(Hebrok & Boks, 2017)	FW	structured literature review	112	Scopus;Web of Science;Google Scholar;ACM Digital Library;	2000 to 2015
45	(Principato et al., 2021)	FW	systematic literature review	233	Scopus; Web of Science	2000 to 2018
46	(Amicarelli & Bux, 2021)	FW	structured literature review	58	Web of Science;	2000 to 2020
47	(Reynolds et al., 2019)	FW	rapid literature review	17	Google Scholar;	2006 to 2017
48	(Guarnieri et al., 2021)	FW	systematic literature review	17	Science Direct;	2007 to 2017

	Author(s)	Food system themes	Review type	Nr of studies reviewed	Bibliographic databases / Search platforms	Time range
49	(Boulet et al., 2021)	FW	systematic literature review	118	Scopus; PsycINFO; CAB Abstract;	2008 to 2019
50	(Bhattacharya et al., 2022)	FW	systematic literature review	300	Science Direct; EBSCO; Web of Science; Emerald;	2008 to 2020
51	(Al-Obadi et al., 2022)	FW	meta-analysis of literature	53	Science Direct; Google Scholar;	2010 to 2021
52	(Barker et al., 2021)	FW	systematic literature review	18	Scopus; IBSS; Web of Science; Psych Info;	2011 to 2021
53	(Moldovan et al., 2022)	FW	systematic literature review	176	Web of Science; Scopus; Google Scholar;	2012 to 2021
54	(Simoes et al., 2022)	FW	systematic literature review	96	Science Direct; Microsoft Academic Research (MAR); MDPI; Scopus;	2015 to 2021
55	(Munir, 2022)	FW	structured literature review	46	EBSCOhost; Scopus; ProQuest (Social Science Databases);	2015 to 2020
56	(Schanes et al., 2018)	FW	systematic literature review	60	Web of Science; Scopus; GoogleScholar;	1980 to 2017
57	(Stangherlin & de Barcellos, 2018)	FW	systematic literature review	84	Web of Science; Scopus; Scielo; Google Scholar; EbscoHost ;	not available
58	(Fraser et al., 2016)	FSC	structured literature review	not available	Web of Science;	1993 to 2013
59	(Freedman et al., 2016)	FSC	systematic literature review	49	Ebsco Host ;	1994 to 2014
60	(Dania et al., 2018)	FSC	structured literature review	30	Emerald; ProQuest; Wiley Online Library; ScienceDirect;	1996 to 2017
61	(Feldmann & Hamm, 2015)	FSC	structured literature review	73	Science Direct; AgEcon Search; Web of Science;	2000 to 2014
62	(Rathgens et al., 2020)	FSC	systematic literature review	291	Scopus; Web of Science; Google scholar;	2007 to 2017
63	(Ferrari et al., 2019), A	FSC	systematic literature review	25	Web of Science; Scopus; EconLit; CAB Abstracts;	2008 to 2018
64	(Tian & Kamran, 2021)	FSC	systematic literature review	117	Web of Science;	1961 to 2021
65	(Sovacool et al., 2021)	FSC	structured literature review	701	ScienceDirect ; JSTOR; Project Muse; Hein Onlin; PubMed; SpringerLink; Taylor & Francis; Taylor & Francis; Wiley Blackwell; Sage Journals; Google Scholar	up to 2020
66	(Mehmood et al., 2021)	CFS	systematic literature review	58	Web of Science; Emerald Insight; Science Direct; Tylor and Francis; Willey;	2009 to 2019
67	(Aschemann-Witzel & Stangherlin, 2021)	CFS	systematic literature review	18	ProQuest; ScienceDirect; EBSCOhost;	2010 to 2020
68	(Hamam et al., 2021)	CFS	systematic literature review	27	Scopus; Web of Science; Science Direct ;	2013 to 2020
69	(do Canto et al., 2021)	CFS	systematic literature review	53	Science Direct; EBSCO Business Source; Web of Science; Scopus;	2016 to 2020
70	(De Bernardi et al., 2023)	CFS	systematic literature review	136	Scopus; Web of Science;	not available

Table 10 Guiding table for reference search in the selected reviews (sustainable farming)

MAIN CATEGORY	PARENT SUB-CATEGORY	CHILD SUB-CATEGORY	(Anibaldi et al., 2021)	(Bartkowski & Bartke, 2018)	(Baumgart-Getz et al., 2012)	(Burton, 2014)	(Campos, 2022)	(David et al., 2022)	(Dessart et al., 2019)	(Foguesatto et al., 2020)	(Jones et al., 2020)	(Knowler & Bradshaw, 2007)	(Low et al., 2023)	(Mills et al., 2021)	(Pannell et al., 2006)	(Prokopy et al., 2019)	(Rajendran et al., 2016)	(Ranjan et al., 2019)	(Rosario et al., 2022)	(Sapbamrer & Thammachai, 2021)	(Tey et al., 2017)
ATTITUDE	Resistant to or postponing change							x	X												
	Towards AES practices											X				X				X	
	Blame shifting					X			X									X			
	Attitude towards environment		X	X			X	X	X		X			X		X			X	X	
	Attitude towards health																			X	
	Attitude towards profit			X			X		X			X								X	
	Attitude towards risk			X	X				X						X		X	X		X	
EXOGENEOUS FACTORS	Economic factors		X				X	X	X									X			X
	General exogeneous factors											X	X		X	X	X	X		X	
EXPERIENCE	AES experience			X	X	X		X	X		X		X	X		X	X	X			
	General experience					X	X	X				X		X		X	X			X	X
FARM CHARACTERISTIC	Bio-physical circumstances		X	X			X	X	X	X	X	X				X	X	X		X	X
	Equipment		X	X			X			X	X	X				X					
	Farm size			X	X		X	X		X	X	X			X	X	X			X	X
	Farming practices											X				X	X		X	X	X
	Labour availability											X				X	X				
	Location		X				X	X		X		X			X		X			X	X
	Marketing activities							X								X				X	
	Production type		X				X														X
	Tenure		X	X	X		X	X		X		X		X		X	X	X			X
	Economic attributes	Financial situation	X					X	X		X	X		X	X	X	X			X	X
		Income / Wealth	X		X		X	X		X	X	X				X				X	X
KNOWLEDGE / AWARENESS	Access to information		X					X													X

MAIN CATEGORY	PARENT SUB-CATEGORY	CHILD SUB-CATEGORY	(Anibaldi et al., 2021)	(Bartkowski & Bartke, 2018)	(Baumgart-Getz et al., 2012)	(Burton, 2014)	(Campos, 2022)	(David et al., 2022)	(Dessart et al., 2019)	(Foguesatto et al., 2020)	(Jones et al., 2020)	(Knowler & Bradshaw, 2007)	(Low et al., 2023)	(Mills et al., 2021)	(Pannell et al., 2006)	(Prokopy et al., 2019)	(Rajendran et al., 2016)	(Ranjan et al., 2019)	(Rosario et al., 2022)	(Sapbamrer & Thammachai, 2021)	(Tey et al., 2017)
	Education	Formal education		X	X	X	X	X		X	X				X	X	X			X	X
		Other education			X											X	X			X	X
	Environmental awareness				X		X			X		X		X		X		X	X		
	Knowledge / Awareness in general				X							X		X					X	X	
	Lack of knowledge		X						X												
PERCEPTIONS	Benefits and drawbacks	AES practices	X					X	X			X			X				X	X	
		Compatibility	X	X		X	X	X	X	X					X			X			X
		Complexity	X							X					X						X
		Economic benefits	X	X			X	X	X			X			X			X		X	X
		Efficacy																	X		
		Environmental benefits									X							X			
		Management						X										X			
		Spill-over effect													X						
		Triability	X						X						X				X		X
	Control		X				X	X		X		X						X	X		
	Risks		X				X	X	X		X		X		X				X	X	
CONCERNS	Environmental concern					X	X		X	X		X						X			
	Food security concern							X													X
	Health concern									X		X									
	Moral concern								X												
NORMS	Descriptive norm																			X	
	Injunctive norm						X	X	X											X	
	Social norm			X		X	X	X	X		X			X	X			X		X	X
PERSONAL ATTRIBUTES	Beliefs							X	X										X		
	Environmental awareness													X							
	Identity										X					X		X			
	Motivation							X	X									X			

MAIN CATEGORY	PARENT SUB-CATEGORY	CHILD SUB-CATEGORY	(Anibaldi et al., 2021)	(Bartkowski & Bartke, 2018)	(Baumgart-Getz et al., 2012)	(Burton, 2014)	(Campos, 2022)	(David et al., 2022)	(Dessart et al., 2019)	(Foguesatto et al., 2020)	(Jones et al., 2020)	(Knowler & Bradshaw, 2007)	(Low et al., 2023)	(Mills et al., 2021)	(Pannell et al., 2006)	(Prokopy et al., 2019)	(Rajendran et al., 2016)	(Ranjan et al., 2019)	(Rosario et al., 2022)	(Sapbamrer & Thammachai, 2021)	(Tey et al., 2017)
	Personality							X	X						X		X	X		X	
	Trust							X			X			X				X	X		X
	Values						X														X
INTERVENTIONS / TOOLS	Communication / Marketing							X	X												
	Policy design						X		X				X					X		X	
	Financial incentive							X	X		X		X		X		X	X		X	X
	Legislation / Regulation		X	X			X		X				X					X			
	Service provision		X	X				X	X					X				X			X
SOCIAL RELATIONS	Business network				X																
	Collaboration							X													
	Collectivism										X										
	Peers and community of peers			X				X	X			X				X		X		X	X
	Social network		X	X						X	X			X	X						X
	Vested interest							X	X												
SOCIO-DEMOGRAPHIC FACTORS	Age			X	X	X	X	X	X	X	X	X		X	X	X	X			X	X
	Gender		X	X		X	X				X									X	X
	Health status									X											
	Household size							X		X	X									X	X
	Family				X		X														

Table 11 Guiding table for reference search in the selected reviews (sustainable food consumption in general)

c	PARENT SUB-CATEGORY	CHILD SUB-CATEGORY	(Bastounis et al., 2021)	(Cecchini et al., 2018)	(Hartmann et al., 2021)	(Kowalsky et al., 2022)	(Sanchez et al., 2021)	(Shah et al., 2021)	(Sullivan et al., 2021)	(Tobi et al., 2019)
ATTITUDES	Attitudes towards food							X		
	Emotional attitudes	Emotional attitudes			X					
		Anthropomorphizing			X					
	Food neophobia							X		
	Resistant / postponing / dissociating							X		
CONCERNS	Environmental concern		X		X		X	X		
	Food Safety concern				X		X			
	Health concern				X			X		
	Naturalness concern				X					
	Quality concern				X					
FOOD ENVIRONMENT RELATED FACTORS	Availability				X	X	X	X		
	Brand				X		X	X		
	Catering								X	
	Communication / Messages				X					
	Locality						X	X	X	
	Packaging				X			X		
	Presentation				X					
	Promotion and marketing				X					
INTERVENTIONS / TOOLS	Information / awareness raising	Direct recommendation from expert						X		
		Information provision		X	X			X		
	Labels		X	X			X	X		X
	Nudges				X			X	X	
KNOWLEDGE AND AWARENESS	Environmental awareness				X		X	X		
	Health awareness							X		
	Knowledge in general				X		X	X		
	Convenience				X			X		

c	PARENT SUB-CATEGORY	CHILD SUB-CATEGORY	(Bastounis et al., 2021)	(Cecchini et al., 2018)	(Hartmann et al., 2021)	(Kowalsky et al., 2022)	(Sanchez et al., 2021)	(Shah et al., 2021)	(Sullivan et al., 2021)	(Tobi et al., 2019)
LIFESTYLE RELATED FACTORS	Dietary identity / habits				X					
	Regular buyer						X			
	Usage barrier				X					
MEDIA								X		
NORMS	Social norms				X	X		X		
PERCEPTIONS	Appearance	Abnormal / sub type appearance			X					
		Appearance in general			X			X		
	Expiration date				X		X	X		
	Health halo effect									X
	Quality		X					X		
	Risk / uncertainty				X					
	Stigmatization							X		
	Taste			X	X		X	X		
	Unattractive sustainable food solutions				X				X	
	Values	Emotional values					X			
PRICE RELATED FACTORS	Price as a barrier			X	X			X		
	Price as quality cues				X					
	Price discount				X			X		
SOCIO DEMOGRAPHIC FACTORS	Age		X	X	X			X		
	Education		X	X	X			X		
	Ethnicity and culture				X			X		
	Family relations						X	X		
	Gender		X	X	X		X	X		
	Household size				X		X	X		
	Income				X		X	X		
	Place of living						X			
TRUST RELATED FACTORS	Trust in government				X					
	Trust in science				X					

Table 12 Guiding table for reference search in the selected reviews (organic food consumption)

MAIN CATEGORY	PARENT SU-CATEGORY	CHILD SUB-CATEGORY	(Aschemann-Witzel & Zielke, 2017)	(Bastounis et al., 2021)	(Cecchini et al., 2018)	(Hartmann et al., 2021)	(Katt & Meixner, 2020)	(Kushwah et al., 2019)	(Roy et al., 2023)	(Sanchez et al., 2021)	(Shah et al., 2021)	(Sullivan et al., 2021)
ATTITUDES	Attitude towards environment	Attitude towards environment					X					
	Attitude towards health	Attitude towards health					X					
	Attitudes towards food	Attitude towards organic products								X		
		Scepticism towards organic food org						X				
	Emotional attitudes	Nostalgia						X				
	Resistant / postponing / dissociating		X									
CONCERNS	Environmental concern		X				X	X	X			
	Ethical concern						X					
	Food safety				X		X		X	X		
	Health concern		X				X	X	X			
FOOD ENVIRONMENT RELATED FACTORS	Assortment		X									
	Availability		X				X	X	X			
	Food environment in general		X				X	X				
	Locality						X					
	Promotion and marketing						X					
INTERVENTIONS / TOOLS	Information / awareness raising	Facilitating experience	X									
		Information provision	X									
	Labels		X	X	X	X	X	X	X		X	

MAIN CATEGORY	PARENT SU-CATEGORY	CHILD SUB-CATEGORY	(Aschemann-Witzel & Zielke, 2017)	(Bastounis et al., 2021)	(Cecchini et al., 2018)	(Hartmann et al., 2021)	(Katt & Meixner, 2020)	(Kushwah et al., 2019)	(Roy et al., 2023)	(Sanchez et al., 2021)	(Shah et al., 2021)	(Sullivan et al., 2021)
	Policy design / legislation	Legislation	X									
		Policy design	X									
KNOWLEDGE AND AWARENESS	Knowledge in general		X				X	X	X	X		
LIFE STYLE RELATED FACTORS	Convenience							X				
	Dietary identity / habits							X				
	Experience	Experience with growing own food								X		
		Experience with organic food consumption	X									
	Regular buyer	Regular organic food buyer	X		X	X	X					
	Usage barrier							X				
MEDIA	Media							X	X			
NORMS	Cultural norms						X	X	X			
	Environmental norms								X			
	Moral norms								X			
	Social norms							X	X			
PERCEPTIONS	Appearance	Appearance in general	X							X		
	Familiarity	Familiarity					X					
	Quality	Quality					X					
	Risk / uncertainty	Risk / uncertainty						X		X		
	Sensory cues	Sensory cues						X		X		
	Taste	Taste	X									
	Values	Brand value	X				X		X			
		Emotional values						X				
		Nutritional value							X			

MAIN CATEGORY	PARENT SU-CATEGORY	CHILD SUB-CATEGORY	(Aschemann-Witzel & Zielke, 2017)	(Bastounis et al., 2021)	(Cecchini et al., 2018)	(Hartmann et al., 2021)	(Katt & Meixner, 2020)	(Kushwah et al., 2019)	(Roy et al., 2023)	(Sanchez et al., 2021)	(Shah et al., 2021)	(Sullivan et al., 2021)
		Value barrier						X				
PRICE RELATED FACTORS	Price as a barrier		X			X	X	X	X	X		X
	Price as quality cues		X				X					
	Price discount										X	
	Price knowledge		X					X				
	Price sensitivity		X				X					
SOCIO DEMOGRAPHIC FACTORS	Age		X									
	Education		X									
	Gender					X				X		
	Household size		X				X					
	Income		X				X		X			
	Place of living								X			
TRUST RELATED FACTORS	Trust in organic products		X					X		X		

Table 13 Guiding table for reference search in the selected reviews (alternative meat consumption)

MAIN CATEGORY	PARENT SUB-CATEGORY	CHILD SUB-CATEGORY	(Bastounis et al., 2021)	(Cecchini et al., 2018)	(Fonseca & Sanchez-Sabate, 2022)	(Grundy et al., 2022)	(Harguess et al., 2020)	(Hartmann et al., 2021)	(Kouarfate & Durif, 2023)	(Kwasny et al., 2022)	(Onwezen et al., 2021)	(Sanchez-Sabate et al., 2019)	(Sanchez et al., 2021)	(Sullivan et al., 2021)	(Valli et al., 2023)
ATTITUDES	Attitudes towards food	Attitude towards meat								X	X	X			
	Beliefs in personal impact on change											X			X
	Emotional attitudes	Animal welfare				X	X			X			X		X
		Anthropomorphizing			X					X					
		Disgust					X			X	X				
		Distress about meat consumption								X					
		Guilt								X					
	Food neophobia								X		X				
	Hedonist									X		X			X
	Resistant / postponing / dissociating		X							X		X			X
CONCERNS	Environmental concern								X	X	X	X			X
	Ethical concern								X						
	Food safety								X						X
	Health concern		X						X		X				X
	Novelty concerns								X						X
FOOD ENVIRONMENT RELATED FACTORS	Catering					X				X					
	Food environment in general					X	X					X			

MAIN CATEGORY	PARENT SUB-CATEGORY	CHILD SUB-CATEGORY	(Bastounis et al., 2021)	(Cecchini et al., 2018)	(Fonseca & Sanchez-Sabate, 2022)	(Grundy et al., 2022)	(Harguess et al., 2020)	(Hartmann et al., 2021)	(Kouarfate & Durif, 2023)	(Kwasny et al., 2022)	(Onwezen et al., 2021)	(Sanchez-Sabate et al., 2019)	(Sanchez et al., 2021)	(Sullivan et al., 2021)	(Valli et al., 2023)
	Promotion and marketing										X				
INTERVENTIONS / TOOLS	Information / awareness raising	Free tasting				X									
		Information provision		X		X	X		X	X		X		X	X
		Lifestyle counselling				X									
		School programs				X									
		Self-monitoring				X	X			X					
	Labels						X								
	Pictures				X		X								
KNOWLEDGE AND AWARENESS	Environmental awareness														X
	Knowledge in general										X	X			
LIFESTYLE RELATED FACTORS	Convenience														X
	Dietary identity / habits								X	X	X	X			X
	Experience	Experience with alternative meat consumption								X	X				
NORMS	Cultural norms								X	X	X	X			
	Social norms					X	X			X	X				
PERCEPTIONS	Perception of meat / meat production									X		X			
	Risk / uncertainty								X	X					
	Sensory cues								X		X				X
	Stigmatization											X			

MAIN CATEGORY	PARENT SUB-CATEGORY	CHILD SUB-CATEGORY	(Bastounis et al., 2021)	(Cecchini et al., 2018)	(Fonseca & Sanchez-Sabate, 2022)	(Grundy et al., 2022)	(Harguess et al., 2020)	(Hartmann et al., 2021)	(Kouarfate & Durif, 2023)	(Kwasny et al., 2022)	(Onwezen et al., 2021)	(Sanchez-Sabate et al., 2019)	(Sanchez et al., 2021)	(Sullivan et al., 2021)	(Valli et al., 2023)
	Taste										X				
	Values	Nutritional value													X
PRICE RELATED FACTORS	Price as a barrier											X			X
SOCIO DEMOGRAPHIC FACTORS	Age														X
	Education									X					X
	Gender									X					X
	Household size							X							X
	Income														X
TRUST RELATED FACTORS	Trust in science										X				