Understanding the acquisition, usage, and disposal behaviours in sustainable food consumption: a framework for future studies

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ABSTRACT

Food sustains human life, but household food consumption impacts negatively on the environment. Therefore, many studies in the literature focus on sustainable food consumption. However, these studies are quite fragmented and study only some aspects of food consumption. By applying the thematic analysis approach to available studies in the literature, this research aims to build a framework covering all three phases of food consumption: the acquisition phase (purchasing ingredients), usage phase (cooking, eating, sharing leftover food), and disposal phase (food waste). The framework proposed in this research can become a more comprehensive reference source for future studies in sustainable food consumption topics. In specific, policymakers can use this framework to design effective campaigns/policies to promote sustainable food consumption practices of their residents. Future researchers can reference this framework to conduct more comprehensive studies on sustainable food consumption topics.

Keywords: *sustainable food consumption, sustainable food consumption indicators, food waste, sustainable home cooking, food purchase planning, sustainable eating patterns.*

1. Introduction

Trends of the increasing global population, rising extreme climate, decreasing agricultural labour, and reducing agricultural land have been pressing huge strains on the food systems all over the world. To ensure food security and healthy diets for future generations, it is more necessary than ever to transform food systems toward sustainability. A food system includes all activities relating to the whole process from production – processing – distribution – preparation – and consumption of food (FAO, 2020). Among those stages, food consumption is one of the most important ones. On the global scope, food consumption has serious implications for both public health and environmental quality (Carrus et al., 2018). However, the current food consumption behaviours have many sustainability challenges.

To answer the research question *"What factors should researchers/policymakers take into consideration when studying/investigating sustainable food consumption behaviours of households?"*, I use the thematic analysis approach to review studies in the literature. After reviewing relevant studies in the literature, I found many of them focus on the acquisition phase of food consumption. In specific, they studied sustainable food choices or purchasing behaviours, e.g., attitude toward sustainable products, the intention or actual purchasing organic food/ local food, fair trade products, etc. Another major trend of these studies is sustainable eating patterns, for example, reducing (red) meat consumption, moving toward a plant-based diet, substituting meat

with hybrid meats, or vegetarian motivations, etc. Some recent studies also focus on household food waste while only a few studies the usage phase of food consumption.

Consumption is not exhausted in mere purchases of products or services (Geiger et al., 2018). It means that sustainable food consumption is not simply by purchasing (or intent to purchase) sustainable food products. What if a high percentage of organic and local products - considered sustainable food - are bought by consumers and then end up in a bin (food waste)? And what if the "sustainable" ingredients are cooked by an "unsustainable" method (e.g., waste too much energy when cooking)? We cannot simply conclude that the food consumption behaviour of one consumer is sustainable or unsustainable by just looking at their purchasing behaviour (or even their eating patterns). For this reason, the proposed framework in this research will cover all three phases of food consumption and can become a more comprehensive reference for future researchers/ policymakers when conducting their sustainable food consumption studies/policies.

2. Literature review

+ Consumers' motivations and their food choices

After reviewing the literature, Verain et al. summarise factors promoting sustainable food consumption including "health motives, environmental motives, naturalness, and taste" (Verain et al., 2015). It is widely agreed in the literature that when choosing food, consumers will be strongly affected by egoistic motivations such as freshness, healthiness, quality of food, etc. (Annunziata & Mariani, 2018). Respondents in the study of Kovacs & Keresztes (2002) confirmed that freshness, healthy products, and the intrinsic properties of food are important for their food choices (Kovacs & Keresztes, 2022). In addition, food choices are also affected by social and emotional factors (Steenkamp, 1997 cited in Kovacs & Keresztes, 2022).

+ Awareness of sustainable food consumption

Studies in the literature reveal that consumers lack/ have low awareness of healthy eating and sustainable consumption (de Koning et al., 2015; Gao et al., 2020; Mancini et al., 2017). Most of them are even unaware of the relationship between food consumption and climate change (Ozkaya et al., 2021), for example, only 10% of Americans in the survey of Truelove & Parks recognised the impact of meat consumption on climate change (Truelove & Parks, 2012).

Consumers tend to overestimate packaging's impacts on the environment. Specifically, they believed decreasing the use of excessive packaging is the most important in sustainable food consumption (Lea & Worsley, 2008; Mancini et al., 2017; Tobler et al., 2011). On the other hand, they underestimate the effect of meat production on the environment (Lazzarini et al., 2016), and "only meat products from overseas were seen as very environmentally unfriendly" (Lazzarini et al., 2016). According to Jungbluth, Tietje, & Scholz, compared to the impact of meat production, transportation and packaging of food products are relatively low on the environment (Jungbluth, Tietje, & Scholz, 2000 cited in Simeone & Scarpato, 2020). Among meat types, beef (and other ruminants) "convert resources less efficiently" than pigs and other poultries: "Three times more feed is needed to produce one kilogram of beef compared to pork and, consequently, more cropland is used" (Lazzarini et al., 2016). However, consumers have a low awareness of this problem (Lazzarini et al., 2016).

When investigating the awareness of consumers on organic foods, Lee & Hwang found that "consumers who believe that organic foods are safe and eco-friendly may also believe that overall quality of organic foods is high, which increases value perceptions" (Lee & Hwang, 2016). In their study, Annunziata & Mariani proved that the segment of egocentric-oriented consumers is larger than sustainability-oriented consumers (Annunziata & Mariani, 2018).

+ Food credence attribute and product labels

Studies in the literature reveal that food attributes such as freshness, price, quality, taste, familiarity, convenience (Hoek et al., 2017), safety, naturalness, healthiness, and environmentally friendly (Kovacs et al.,

2022) affect consumers' food choices. Among those attributes, freshness and taste are the most two important ones (Annunziata & Scarpato, 2014; Campbell-Arvai, 2015; de Koning et al., 2015), followed by price and safety and healthiness (Kovacs & Keresztes, 2022). Environmental and social attributes are considered secondary (Annunziata & Scarpato, 2014). Annunziata and Mariani concluded that consumers are following an egoistic approach and attaching more value to quality and health attributes than environmental and social sustainability (Annunziata & Mariani, 2018). The products' elements that cannot be verified by consumers are called credence attributes. These intangible attributes include environmental safety, product origin, social benefits, production conditions, etc. (Kovacs & Keresztes, 2022). "Organic" is also a credence attribute (Lee & Hwang, 2016) because consumers cannot evaluate the claimed quality of organic products on their own. Healthy and other sustainability attributes of food products cannot be observed and experienced by consumers, therefore, are credence attributes (Van Loo et al., 2017).

Since consumers cannot observe credence attributes of sustainable food products (even after their purchasing or consumption), eco-labels play a vital role in promoting these products into the market (Daugbjerg et al., 2014; Lazzarini et al., 2016). For such reason, food product labelling systems in developed countries are expanding quickly. However, different labelling systems in these developed countries confused consumers (Hebrok & Heidenstrøm, 2019) and another problem is the mistrust of consumers on labels (Annunziata & Scarpato, 2014; Haider et al., 2022). Consumers have problems understanding product labels and label does not provide clear indications for their decisions, therefore, they rely on the best-known brands (do not read the label but choose the leading brand) or rely on slogans on the label (Mancini et al., 2017). In some cases, consumers buy food directly from local producers, and labelling becomes unnecessary (Mancini et al., 2017). Time constraint when shopping at stores is one of the main reasons leading to little attention on products' labels; for these consumers, information about the products are obtained via media, newspapers, and the previous phases of consumption (Mancini et al., 2017).

According to Daugbjerg et. al. (2014), the product label will have the desired outcome if consumers understand the label's meaning and trust in it (Daugbjerg et al., 2014). Exposing labels in the shop, and perceiving and understanding them is not enough, label information needs to enter into consumers' decision-making (Grunert, 2011). Moreover, consumers must not make any inferences beyond what labels mean and buy the products because of these wrong inferences. Although some attributes such as animal welfare, nutritional quality, and no residues. etc. are credence attributes, other attributes such as taste, juiciness, tenderness, etc. are experience characteristics and can be disconfirmed after consumption (Grunert, 2011). In his study, Grunert warned that if consumers infer an eco-label beyond its actual meaning, these inferences will be disconfirmed after their consumption and leading to mistrust of the labels and avoiding sustainable products with eco-labels in the future (Grunert, 2011). In his research, Grunert concluded that "the product must be eco-labelled. But eco-labelling is not enough. Consumers must notice, read and understand the eco-label, and should not make inferences that are too far off with regard to what the label actually stands for" (Grunert, 2011).

+ *Consumers' attitudes and intentions toward sustainable food consumption*

The theory of reasoned action was first built by Fishbein & Ajzen in 1975. This theory assumes that human beings usually behave reasonably from their information and beliefs about the particular behaviour of interest (Fishbein & Ajzen, 2009). The theory of reasoned action states that attitude toward the behaviour, perceived norm, and perceived behavioural control of people will form their behavioural intentions. In turn, behavioural intentions predict the actual performance of the behaviour: "the stronger the intention, the more likely it is that the behaviour will be carried out" (Fishbein & Ajzen, 2009). However, lacking actual control (such as a lack of requisite skills and abilities, and the existence of environmental controls) will prevent people from translating their behavioural intentions into actual behaviours (Fishbein & Ajzen, 2009).

Expanding the theory of reasoned action, in 1985, Ajzen introduced the theory of planned behaviour. In this theory, Ajzen defined behavioural intention as "an intention to try performing a certain behaviour", and successful

performance of the intended behaviour “is contingent on the person's control over the various factors that may prevent it”, so “intentions can only be expected to predict a person's attempt to perform a behaviour, not necessarily its actual performance” (Ajzen, 1985). In the theory of planned behaviour, behavioural intention is a function of (1) attitude toward trying, and (2) subjective norm about trying; and intention is an immediate determinant of an attempt to perform a behaviour of a person (Ajzen, 1985). Many researchers applied the theory of reasoned action/ the theory of planned behaviour in their sustainable food consumption studies. Therefore, plenty of studies in the literature focus on attitudes, intentions toward the behaviours, and intention-behaviour gaps.

Literature synthesised in the study of Annunziata & Mariani shows that consumers’ attitudes toward organic products are influenced by main attributes such as resource-saving, low-energy inputs, and the absence of chemicals; animal welfare, better conditions for farm workers, public health concerns; fair prices for producers, and support for small farms and rural communities (Annunziata & Mariani, 2018). Consumers’ attitudes regarding local food are influenced by the short distance between producers and consumers; better conditions for farm workers, building trust and social relationships in the local food system, strengthening local identity (via linking to the tradition and culture of a specific geographical area); job opportunities for local people, support small local producers, fair prices for farmers and producers (Annunziata & Mariani, 2018). Consumers who do not believe in logos/labels of sustainable attributes of food products will not translate their positive attitudes into behavioural intentions (Annunziata & Scarpato, 2014).

The study by Annunziata & Scarpato in 2014 found that consumers who do not trust labels or sustainable claimed information of food products will not tend to translate their positive sustainable attitudes into a behavioural intention (Annunziata & Scarpato, 2014). People’s beliefs about personal or social desirability also possibly influence behavioural intentions toward sustainable food products (Vermeir & Verbeke, 2008). The empirical study of Vermeir & Verbeke about food consumption of Belgium young adults shows that 50% of the sustainable dairy products consuming intention was explained by 4 factors: “personal attitudes, perceived social influences, perceived consumer effectiveness, and perceived availability” (Vermeir & Verbeke, 2008). The more involved with and the more concerned about the potential impact of sustainable foods, the more intention to buy those foods (Bisonette and Contento, 2001 cited in Vermeir & Verbeke, 2008).

+ Perceived self-efficacy and perceived behavioural control

Perceived self-efficacy is the self-evaluation of one person regarding his/her ability to successfully execute an action in a particular situation (Bandura, 1982 cited in Fozouni Ardekani et al., 2021). In the literature, perceived self-efficacy is proven to affect behavioural intention effectively and is used as a factor in many sustainable food consumption studies. For example, consumers’ self-efficacy has been used in the model of Fozouni Ardekani et al. as the self-assessment of consumers about their capabilities to adopt genetically modified foods (Fozouni Ardekani et al., 2021).

Perceived behavioural control includes inner control (self-efficacy) and external perceived difficulty factor (perceived barriers) (Sparks et al., 1997 cited in Vermeir & Verbeke, 2008). An example of an external perceived difficulty factor is the perceived availability of products. Vermeir & Verbeke (2008) defined perceived availability as consumers’ thinking that they can easily obtain or consume a certain product. Therefore, low perceived availability will hamper the intention to buy sustainable products (Vermeir & Verbeke, 2008). Another example of an externally perceived difficulty factor is consumers’ eating habits and knowledge. Specifically, consumers who are unfamiliar with meat substitute food, lack cooking skills, and do not know the negative impact of meat on the environment, etc. are barriers to meat reduction in the diet (Verain et al., 2015).

+ Changing eating habits and food practices toward sustainability

Food consumption policies should further investigate eating habits to encourage consumers to shift to new sustainable food consumption patterns (Scalvedi et al., 2018). Eating meat is the habit of many consumers,

especially male consumers. In their study, de Koning et al. quote one respondent: “Eating less meat is difficult to do in my family because my husband only eats meat”, and so many Vietnamese men consider meat the main portion in their meals (de Koning et al., 2015). Eating meat habits will make them more reluctant to eliminate/ reduce meat in their meals compared to shifting to consuming more sustainable types of meat (Vanhonacker, van Loo, Gellynck, & Verbeke, 2013 cited in Verain et al., 2015). Eating ready-to-eat meals has become increasingly popular, especially for those with busy lifestyles. Pucci et al. found that ready meals can save time and people who eat them think it is convenient and can spend time doing other things than cooking (Pucci et al., 2021).

Changing an individual's food preferences and habits is challenging (Pucci et al., 2021). Changes in the food practices of consumers are often linked to changes in their circumstances, for example, having children or moving to retirement (Pucci et al., 2021). In other words, the eating habits of one consumer can be affected by the eating habits of the people they live with. For example, one respondent in the study of O’Neill et al. confirmed that “her boyfriend was vegetarian and he had influenced her eating habits” (O'Neill et al., 2019). It means the eating habits of each individual can affect the whole family's eating habits. O’Neill et al. found that consumers’ food shopping behaviours, eating habits, and cooking practices can be impacted by changing circumstances of their daily life (such as getting married, having a new son/daughter, having a new full-time job, and moving to retirement), learning from other people, or being persuaded by public events/ campaigns (O'Neill et al., 2019). “The rhythms of family life and an ethics of care in providing ‘proper’ food for one’s family influence what is eaten” (Pucci et al., 2021). Relocation from urban to rural areas can also trigger changes in consumption practices (Pucci et al., 2021).

+ Barriers to sustainable food consumption

Although behavioural intentions control actual behaviours, not all intentions are translated into actual behaviours (Ajzen, 1985). Barriers toward sustainable food consumption can be classified into three groups: product-related barriers, consumer-related barriers, and food-market-related barriers. In the product-related barrier group, high price of sustainable products (organic products) is the most mentioned barrier in the literature (Haider et al., 2022; Lee & Hwang, 2016; Mäkiniemi & Vainio, 2014; Nguyen et al., 2019; Terlau & Hirsch, 2015; Verain et al., 2015; Vitterso & Tangeland, 2015) but Lee & Hwang found that high price is not a barrier for “heavy buyers” of organic food. Another barrier is the bad taste of sustainable products (Mäkiniemi & Vainio, 2014).

Regarding the consumer-related barrier group, eating habit is one of the main barriers to sustainable food consumption. Consumers want to eat the same way as their habits (Mäkiniemi & Vainio, 2014). They are unaware/disbelief of the environmental effects of food production (Mäkiniemi & Vainio, 2014; Verain et al., 2015; Vitterso & Tangeland, 2015) or see no benefit from eating more sustainable and lack motivation to consume sustainable food (Vitterso & Tangeland, 2015). Moreover, consumers also do not trust sustainable labels and certifications (Annunziata & Scarpato, 2014; Mäkiniemi & Vainio, 2014; Terlau & Hirsch, 2015; Vitterso & Tangeland, 2015). Some consumers said that they lack cooking skills for plant-based products, therefore, have difficulties when moving to this kind of eating pattern (Hielkema & Lund, 2021; Vanhonacker et al., 2013; Vitterso & Tangeland, 2015). Busy lifestyle makes people “try to save time in the field of nutrition in order to gain time for their leisure-time activities” (Pfeiffer et al., 2017), therefore, they perceive time barriers: do not have time to prepare sustainable diet or to read and care information of sustainable labels in the food stores (Mancini et al., 2017). Another barrier in this group relates to “food neophobia” (Hielkema & Lund, 2021) - people's avoidance of eating new foods - which means difficult to transform into other eating patterns.

Finally, in the food-market-related barrier group, poor supply (difficulty in finding these products when shopping) is the most popular barrier (Annunziata & Scarpato, 2014; Haider et al., 2022; Mäkiniemi & Vainio, 2014; Terlau & Hirsch, 2015; Vitterso & Tangeland, 2015). A low level of information available is another barrier (Annunziata & Scarpato, 2014; Terlau & Hirsch, 2015; Vitterso & Tangeland, 2015), and overload information is also a barrier (Terlau & Hirsch, 2015). Conventional products have a wider choice (Haider et al., 2022) than

sustainable products may be another barrier in this group.

Literature review shows that "sustainable food consumption" is not a new topic and has been investigated by many studies (especially in recent years). However, existing studies on sustainable food consumption topic are still quite fragmented, and most of them focus on single aspects of sustainable food consumption only (Annunziata & Mariani, 2018); many empirical studies in the literature focus on the acquisition phase (purchasing food) only (Annunziata & Mariani, 2018; Annunziata & Scarpato, 2014; Carfora et al., 2019; Pucci et al., 2021; Vecchio & Annunziata, 2013; von Meyer-Höfer & Spiller, 2013). Consumption is seen as a phenomenon that comprises different phases, and the consumption process is commonly distinguished into three main phases: acquisition, usage, and disposal (Geiger et al., 2018)[1]. It means that sustainable food consumption is not simply by purchasing (or intent to purchase) sustainable food products. What if local products - considered sustainable food - are bought by consumers but then consumed in unsustainable ways (for example, generating too much food waste, or using too much energy while cooking)? Therefore, when studying sustainable food consumption, researchers should analyse the whole process of food consumption to have a comprehensive and deeper view of the topic. However, as far as my knowledge goes, no study on the sustainable food consumption topic incorporates all three phases in their studies. To filling this gap in the literature, this research will build a framework covering all three phases of food consumption: acquisition phase (purchasing ingredients), usage phase (cooking, eating), and disposal phase (sharing leftover food, food waste).

3. Method

3.1. Search strategies and inputs selection process

This research was conducted by applying the thematic analysis approach. Inputs to this research are available studies in the literature that are relevant to sustainable food consumption topics. I mainly used two databases – Web of Science and Scopus – to search and screen relevant documents.

Database	Search Strategy	Inclusion	Exclusion
Web of Science **Scopus**	"sustainab* food consume*" OR "sustainab* agri* food consum*" OR "food consum* sustainab*" OR " agri* food consum* sustainab*"	Article Book	Irrelevant categories: mycotoxin, polymer science, nanoparticles, marine biology, security system. Irrelevant categories: engineering, medicine, nursing, immunology and microbiology, chemistry, earth and planetary sciences, and material sciences.

Table 1: Strategy, inclusion, and exclusion criteria of the document search

At first, I used the broad search strategy: "sustainab* food consume*" OR "sustainab* agri* food consum*" OR "food consum* sustainab*" OR "agri* food consum* sustainab*" on Web of Science and Scopus databases to find relevant articles. A raw dataset of 699 documents published from 1999 to 2022 was found (356 documents from Web of Science; and 343 documents from Scopus. After setting inclusion and exclusion criteria *(see Table 1)*, the total number of documents was reduced to 422 (284 documents via Web of Science and 138 documents via Scopus) and after deleting duplicate ones, the remaining were 335 documents *(see Figure 1)*. These 335 documents were further screened based on the titles and abstracts. We eliminated the documents that are not relevant to the food consumption topic, articles about ready-to-eat food (such as fast food, food in

[1] Acquisition phase: commonly through purchase, but also possible through swapping, sharing, etc.; Usage phase: this is the phase of actual consumption (cooking, storing); Disposal phase: through removal, bartering, giving away, selling and food waste etc.

Geiger, S. M., Fischer, D., & Schrader, U. (2018). Measuring What Matters in Sustainable Consumption: An Integrative Framework for the Selection of Relevant Behaviors. *Sustainable development (Bradford, West Yorkshire, England)*, *26*(1), 18-33. https://doi.org/10.1002/sd.1688

restaurants, etc.), articles about food policies of countries, and articles that do not have the English version. Finally, we selected 68 documents (most of them are empirical studies) to further read and synthesise in this article *(see Figure 1)*.

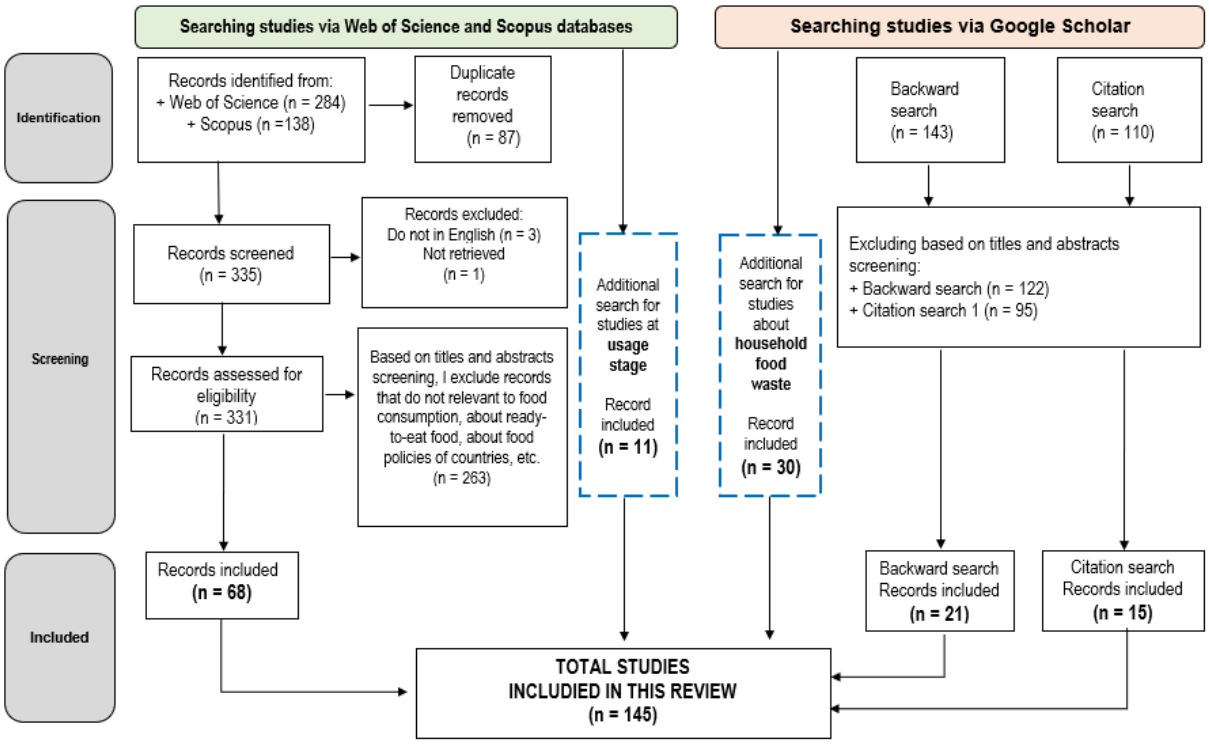

Figure 1: Search strategy to find inputs for the article

Since I only searched documents in the Web of Science and Scopus databases, it is inevitable to miss the relevant documents in the literature but not in these two databases. To minimising this limitation, I also use Google Scholar to apply backward and citation (forward) searches of the selected studies.

To prepare for the backward search, I conducted a similar search strategy as in Table 1 but set the inclusion criteria of "review article". There were 36 literature review articles found (17 from the Web of Science and 19 from Scopus). After deleting 12 duplicate ones, and then applying title and abstract screening, there were 8 literature review articles on sustainable food consumption topics left. These 8 literature review articles were selected for backward search by looking at their reference lists, comparing these lists with **68 selected documents** (avoid duplicating), using Google Scholar to retrieve the documents, and then screening the targeted articles based on the titles and abstracts. From a backward search, I found 143 relevant articles and these documents were further screened based on the titles and abstracts. Finally, I selected **21 documents** (most of them are empirical studies) to further read and synthesise in this article *(see Figure 1)*.

Among 68 selected documents, I found the ones having high citations, then using Google Scholar, I applied citation search (forward search) on these high citation articles, setting date criteria from 2000 to 2023, and retrieving documents from the first 10 pages of Google Scholar, I found 110 relevant articles (after discarding the duplicated ones). Then these articles were further screened based on titles and abstracts. Finally, I selected **15 documents** to further read and synthesise in this article *(see Figure 1)*.

When screening the above articles, I realized that most of these articles focus on the acquisition phase of food consumption, some recent studies also focus on household food waste while only a few results regarding the usage phase of food consumption. In specific, most of these articles mainly studied sustainable food choices or purchasing behaviours, e.g., attitude toward sustainable products, the intention or actual purchasing organic

food/ local food, fair trade products, etc. Another major trend of these studies is sustainable eating patterns, for example, reducing (red) meat consumption, moving toward a plant-based diet, substituting meat with hybrid meats, or vegetarian motivations, etc. This finding helps me understand why the current systematic literature review articles on the sustainable food consumption topic only focus on the acquisition phase.

As mentioned above, sustainable food consumption is not simply by purchasing (or intent to purchase) sustainable food products. What if a high percentage of organic and local products - considered sustainable food - are bought by consumers and then end up in a bin (food waste)? And what if the “sustainable” ingredients are cooked by an "unsustainable" method (e.g., waste too much energy when cooking)? We cannot simply conclude that the food consumption behaviour of one consumer is sustainable or unsustainable by just looking at their purchasing behaviour (or even their eating patterns). Instead, researchers and policymakers should apply a more comprehensive approach in their sustainable food consumption studies/policies.

To provide a more comprehensive reference on this topic, I conducted another search in Web of Science and Scopus database (do not set date constraints) to find more relevant documents in the usage phase. Usage of food at the household level can be divided into two phases: preparing/cooking food and storing food. Therefore, I set two following search strategies: (1) ("household cooking" OR "home cooking") AND (sustainabl*); (2) ("food storage") AND (home OR household) AND (sustainabl*). After deleting duplicate documents, and applying titles and abstracts screening, I found another **11 documents** to further read in this literature review *(see Figure 1)*.

I also used Google Scholar to search for more studies about food waste topics. Interestingly, most of the articles found when searching with the keywords “food waste” and “household” studied the whole process of food consumption: from planning what to buy, storing food at home, and cooking, to disposing, and food waste. After applying the title and abstract screening on these articles, I found **30 documents** regarding household food waste to further analyse and synthesise in this article.

Documents were searched and screened from September 2022 to February 2023. Finally, all 145 selected documents were selected to further read for this article.

3.2. Coding process

All 145 selected documents were carefully read and coded using the NVivo 1.6.1 version.

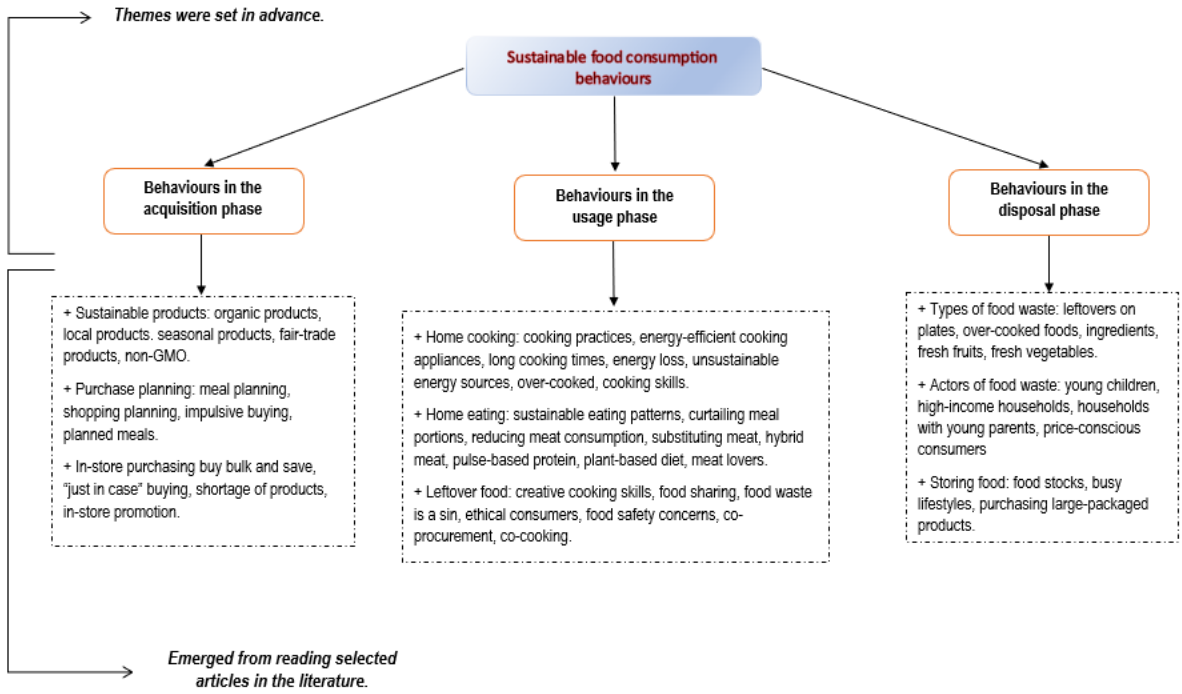

Figure 2: Coding process of the article

The coding process was undertaken by me from February 2023 to May 2023. To develop the idea that the consumption process is commonly distinguished into three main phases: acquisition, usage, and disposal (Geiger et al., 2018), the three main themes - acquisition phase, usage phase, and disposal phase - were set prior. The smaller themes in these three main themes - for example, *purchase planning behaviours, moral attitudes & food sharing, communicating between family members and household food waste, etc.* - emerged from the data (by reading 145 selected documents and finding relevant inputs).

3.3. Number of articles in the themes

Before reading the contents, 145 selected documents were classified into three main themes. There are 18 articles studying sustainable food consumption (SFC) in general: for example, willingness to adopt SFC, using the theory of planned behaviour and extension versions in SFC, attitude toward SFC, awareness about SFC, etc. The 127 remaining articles are classified into the main themes based on titles and abstracts screening.

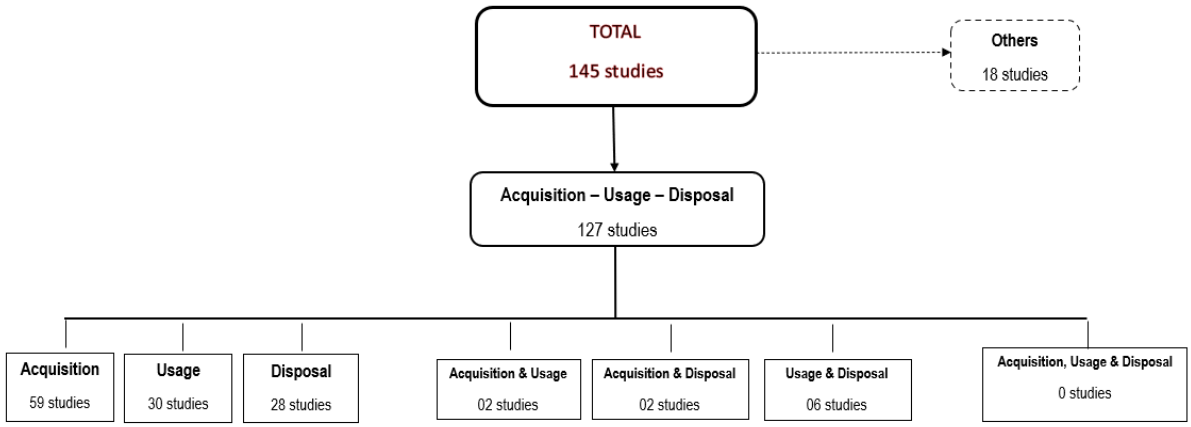

Figure 3: Number of articles in the main themes

In addition to studies about cooking behaviours, energy used in cooking, eating behaviours, etc., studies about "eating patterns" such as reducing meat consumption/adopting plant-based diets also be assigned in the "usage phase". All studies about food waste in households were assigned to the "disposal phase".

Figure 3 reveals that 117 articles investigated a separate phase of consumption (92% of 127 selected articles), and the majority of them (59 articles) studied the acquisition phase of food consumption. 10 articles study two phases of food consumption - acquisition & usage (2 articles), acquisition & disposal (2 articles), and usage & disposal (6 articles) – while no article covers all three phases of food consumption.

After classifying 127 studies into different main themes, I read them carefully to find and code the sub-themes and used these inputs to write section 4 (Results) of this article. Although I read all the studies, not all of them are cited in section 4 of this article (I only cited relevant ones to the selected sub-themes). Table 2 below illustrates some relevant studies on the core themes of this article.

Themes	Title	Year	1st author	Journal	Country
Sustainable food products	Consumers' willingness-to-pay for sustainable food products: the case of organically and locally grown almonds in Spain	2016	Tiziana de-Magistris	Journal of Cleaner Production	Spain
	Exploring local and organic food consumption in a holistic sustainability view	2018	Maria Luisa Scalvedi	British Food Journal	Italy
	"I Eat Organic for My Benefit and Yours": Egoistic and Altruistic Considerations for Purchasing Organic Food and Their Implications for Advertising Strategists	2014	Ioannis Kareklas	Journal of Advertising	USA
Purchase planning behaviours	Preventing household food waste via nudging: An exploration of consumer perceptions	2018	Carolin von Kameke	Journal of Cleaner Production	Germany
	Consumer behaviour types in household food waste	2019	Elisa Di Talia	Journal of Cleaner Production	Italy
	Food waste in Australian households: Role of shopping habits and personal motivations	2021	Nazia Nabi	Journal of Consumer Behaviour	Australia
Home cooking behaviours	Impacts of cooking methods and appliances on the GHG emission of food	2020	Frankowska	Nature Food	UK
	The Household Cooking Sector in Nigeria: Environmental and Economic Sustainability Assessment	2015	Haruna Gujba	Resources	Nigeria
	Increasing the sustainability of household cooking in developing countries: Policy implications	2012	Wouter H. Maes	Renewable and Sustainable Energy Reviews	N/A
	Household Food Waste Solutions for Behavioral Economists and Marketers	2018	Brian Wansink	Food Products Marketing	N/A
Sustainable eating patterns	Sustainable food consumption. Product choice or curtailment?	2015	Muriel C.D. Verain	Appetite	Netherlands

	Sustainable vs. Unsustainable Food Consumption Behaviour: A Study among Students from Romania, Bulgaria and Moldova	2020	Cristina Bianca Pocol	Sustainability	Romania, Bulgaria, Moldova
	Healthy, sustainable and plant-based eating: Perceived (mis)match and involvement-based consumer segments as targets for future policy	2017	Ellen J. Van Loo	Food Policy	UK, Germany, Belgium, Netherlands
	Barriers and facilitators towards adopting a more plant-based diet in a sample of Danish consumers	2019	Malou F.S. Reipurth	Food Quality and Preference Journal	Denmark
	Meat, beyond the plate. Data-driven hypotheses for understanding consumer willingness to adopt a more plant-based diet	2015	João Graça	Appetite	Portugal
Reusing leftover food behaviours	Factors affecting household food waste among young consumers and actions to prevent it. A comparison among UK, Spain and Italy	2020	Laura Bravi	Resources, Conservation & Recycling	Italy, Spain, UK
	Practising thrift at dinnertime: mealtime leftovers, sacrifice and family membership	2013	Benedetta Cappellin	The Sociological Review	UK
	Domestic food practices: A study of food management behaviors and the role of food preparation planning in reducing waste	2018	Simona Romani	Appetite	Italy
Food sharing behaviours	Understanding food waste behavior: The role of morals, habits and knowledge	2020	Asli Elif Aydin	Journal of Cleaner Production	Turkey
	Determinants and Prevention Strategies for Household Food Waste: An Exploratory Study in Taiwan	2021	Chih-Ching Teng	Foods	Taiwan
	Bringing a Sharing Economy Approach into the Food Sector: The Potential of Food Sharing for Reducing Food Waste	2017	Pasquale Marcello Falcone	Book, Chapter 10	N/A
	Navigating Towards Sustainable Development: Determinant and Prevention Strategies for Household Food Waste in Malaysia	2022	Fazreena Mansor	Malaysian Journal of Social Sciences and Humanities	Malaysia

Table 2: Some relevant studies in the core themes of this article

4. Results

After reviewing relevant articles in the literature, based on the "consumption" definition[2] of Geiger et al. (2018) and putting this definition in sustainable and food concepts, in this article, I define: *"Sustainable food consumption is the whole process from acquiring, using, and disposing of food to meet daily household food needs wisely and environmentally friendly through limited greenhouse gas emission and household food waste".*

4.1. Acquisition phase

4.1.1. Sustainable food products

Organic products are produced based on a natural process, do not use chemical fertilisers (Kareklas et al., 2014), and minimise the use of soil harmful practices when production (Scalvedi & Saba, 2018). Therefore, organic food is broadly recognised as sustainable food and is widely studied in the literature. Local products are also extensively investigated in the sustainable food field because of the "food miles" concept. Local food (usually trading in alternative/ short food supply chains) promotes short distances from producers to consumers (Scalvedi & Saba, 2018). Compared to conventional agriculture, both organically and locally grown products require less greenhouse gas emissions, therefore, reducing environmental impacts in production (de-Magistris & Gracia, 2016). Seasonal-grown products are another criterion in sustainable fruit and vegetable consumption studies (de Koning et al., 2015; Kovacs et al., 2022; Sidali et al., 2016; Tobler et al., 2011). Some researchers also considered animal welfare/ ethical treatment of animals in their sustainable food studies (Fox & Ward, 2008; Brunori et. al. cited in Vecchio & Annunziata, 2013) while some others are interested in fair-trade products, non-GMO products, or hybrid meat (meat substitute) products, etc.

4.1.2. Purchase planning behaviours

Studies in the literature emphasise the important role of planning and its effects on household food waste. Planning includes meal planning and shopping planning (with the shopping list). Long-term meal planning will help reduce food waste (Love Food Hate Waste, 2018 and WRAP, 2012 cited in Hebrok & Heidenstrøm, 2019; Lin & Guan, 2021; von Kameke & Fischer, 2018) because it can help avoid over-buying/impulsive-buying (Di Talia et al., 2019; Romani et al., 2018; and Wansink, 2018 cited in Bravi et al., 2020; Di Talia et al., 2019). However, "planned shopping can only reduce food waste if consumers are high on self-regulation and manage to discipline themselves to stick to the list during actual shopping" (Nabi et al., 2021).

On contrarily, Hebrok & Heidenstrøm argued that full-week meal planning will lead to more food waste (Hebrok & Heidenstrøm, 2019) since some unforeseen events (unexpected dining out) will prevent people from consuming the planned meals (Farr-Wharton et al., 2014; Evans, 2011 cited in Nabi et al., 2021). To overcome this, some researchers recommend a more flexible planning strategy: "buying what you need when you need it" (Hebrok & Heidenstrøm, 2019).

4.1.3. Food purchasing behaviours

Literature review shows that there are a large proportion of consumers applied 'buy bulk and save' to save time for household food shopping. Bulk purchasing is one of the huge contributors to household food waste (Farr-Wharton et al., 2014), especially when buying food enough for several weeks but not planning meals before shopping (Stefan et al., 2013 cited in Aydin & Yildirim, 2021). "Just in case" buying is another reason why households waste their food (Mansor et al., 2022). Expected food price increase is one reason under this behaviour or expected shortage of products will lead to panic buying which happened widely during the initial stages of the Covid-19 pandemic (Mansor et al., 2022).

Behaviours of consumers are also affected by promotion/impression when they are in-store. Stores'

[2] Consumption is seen as a phenomenon that comprises different phases, and the consumption process is commonly distinguished into three main phases: acquisition, usage, and disposal.

promotion such as “buy one get one free” makes consumers purchase more than they need and cause household food waste (Williams et al., 2012 and Koivupuro et al., 2012 cited in Aydin & Yildirim, 2021). In addition, when purchasing food at stores, “consumers have the impression that their needs are much greater than they truly are, which also leads to buying excessive amounts of products” (Mansor et al., 2022).

4.2. Usage phase

4.2.1. Home cooking behaviours

In the study “Impacts of cooking methods and appliances on the GHG emission of food”, Frankowska et.al. warned that “unsustainable cooking practices such as prolonged heating-up of the oven or overcooking of food, as well as not using energy-efficient appliances may be factors which increase GHG emissions unnecessarily (Frankowska et al., 2020). This study also found that meat cooking - due to the long cooking times - accounts for the “highest overall emissions across the various foods in the UK” (Frankowska et al., 2020). Energy loss when using a stovetop in cooking leads to its high impact on GHG; among the most popular cooking appliances in UK, “ovens are the least sustainable due to comparatively long cooking time and high energy demand, while microwaves have the lowest overall impact” (Frankowska et al., 2020).

In Nigeria, the household cooking sector uses the largest percentage of energy; and this energy mainly comes from unsustainable energy sources (Gujba et al., 2015). The study “Increasing the sustainability of household cooking in developing countries: policy implications” was conducted more than a decade ago and showed that people rely on traditional biomass (mainly charcoal and firewood) in their home cooking (Maes & Verbist, 2012). Each energy unit from charcoal impacts hugely on the planet because of its very high GHG emissions (Maes & Verbist, 2012). In addition to low efficiency, traditional cookstoves emit large toxic elements; among all energy sources for cooking, electricity is the cleanest and safest one (Maes & Verbist, 2012).

Food that is burnt, over-cooked, or cooked food does not taste good, etc. is the reason leading to food waste (Wansink, 2018). This implies the role of cooking skills in food waste reduction. In households having small children, mothers (with their caring) tend to cook many dishes (Mansor et al., 2022) to feed their children and these behaviours lead to more food waste. Women who have full-time jobs and busy lifestyles “prefer to cook a lot at one time and then just reheat the food for the next meal” to save time but “end up is more waste as compared to preparing in a small quantity” (Porpino et al., 2016 cited in Mansor et al., 2022). When having guests, households tend to waste more food because of their hospitality. The hosts try to entertain their guests by preparing many dishes and more food than can be consumed (Lin & Guan, 2021).

4.2.2. Home eating behaviours

4.2.2.1. Sustainable eating patterns

In addition to choosing sustainable food products, choosing sustainable eating patterns - e.g. curtailing the quantity of food in portions, reducing (red) meat consumption, or substituting meat with hybrid meat or pulse-based protein - is considered another strategy toward sustainable food consumption (Ozkaya et al., 2021; Verain et al., 2015). Compared to plant-based foods, producing meat has a huge impact on the environment (Pocol et al., 2020; Zur & A. Klöckner, 2014). Therefore, many studies about sustainable eating patterns in the literature investigated topics around meat reduction behaviours as well as plant-based eating motivations (Elghannam et al., 2018; Kemper, 2020; Pocol et al., 2020; Van Loo et al., 2017; Zur & A. Klöckner, 2014).

Besides having a lower impact on the environment, curtailing meat and increasing plants in consumers’ eating patterns can help improve their health (Tilman and Clark, 2014 and Verain et al., 2015, cited in Olsen & Tuu, 2021; Pocol et al., 2020; Van Loo et al., 2017). However, it is extremely challenging to shift the eating patterns of consumers, especially meat lovers. For many consumers, meat (especially red meat) is nutritious (Profeta, Baune, Smetana, Broucke, Van Royen, et al., 2021), and vegetarianism will lead to malnutrition (Vitterso & Tangeland, 2015). Meat lovers said that a plant-based diet is not tasty (Reipurth et al., 2019); meat is a crucial part of their meals (de Koning et al., 2015), makes them feel pleasure and satiated (Graça et al., 2015).

They crave to eat meat because of its taste (Kemper, 2020) and feel sad, bad, weak, and missing something without meat in their meals (Graça et al., 2015).

To facilitate a transition to plant-based diets of meat eaters, hybrid meat is possible a solution. Meat lovers are more open to hybrid meat (meat is mixed with plant-based ingredients to make hybrid meat) than vegetarian substitutes (Profeta, Baune, Smetana, Broucke, Van, et al., 2021). However, there is also a concern that hybrid meat "are not necessarily optimal from an environmental perspective, because their processing stage can require a considerable input of energy, and they often contain a high share of egg protein" (Davis, J., et. al., 2010 and Aiking, H, 2014 cited in Profeta, Baune, Smetana, Broucke, Van, et al., 2021).

4.2.2.2. Reusing leftover food behaviours

Reusing leftover food is one of the strategies to reduce food waste at the household level (Stancu et al., 2016 and Stefan et al., 2013 cited in Ananda et al., 2023; Bravi et al., 2020). Households can use leftover food to feed their poultry (Vidal-Mones et al., 2021 cited in Mansor et al., 2022) or feed their pets and animals (Teng et al., 2020). People who sacrifice for other family members tend to eat up leftover food (Cappellini & Parsons, 2012). Someone with creative cooking skills can use leftover food to cook a new dish (Vidal-Mones et al., 2021 cited in Mansor et al., 2022).

However, not all people are willing to reuse leftover food. Some consumers never use leftover food (Lin, 2021; Romani et al., 2018) because of "boredom associated with repetition of the same dishes" (Farr-Wharton et al., 2014) and its bad tastes, looks, and smells (Evans, 2012 cited in Mansor et al., 2022). Consumers will eat what they desire to eat rather than what is currently in the fridge (Baker et al., 2009, cited in Hebrok & Heidenstrøm, 2019).

In addition, storing behaviour affects the edible of leftover food. Sometimes, people forget leftover food in the fridge, and they are spoiled before can be consumed (Farr-Wharton et al., 2014; Hebrok & Heidenstrøm, 2019; Wansink, 2018). Similarly, the leftover ingredients from previous cooking "were often forgotten about when placed back in storage, because they were small and often placed behind other items" (Farr-Wharton et al., 2014).

4.2.2.3. Moral attitudes and food sharing

When consumers believe that throwing food away is a wrong action, they will waste less food (Aydin & Yildirim, 2021; Graham-Rowe et al., 2014 cited in Nabi et al., 2021). This belief may be generated from the religious belief that food waste is a sin, care about a large number of people in poor countries who die of hunger, and set an example for their children (Jessica Aschemann-Witzel et al., 2015 and Setti et al., 2018 cited in Ananda et al., 2023). In some countries, it can be "a moral obligation to finish all the food served on the plate" (Aydin & Yildirim, 2021).

To reduce food waste, ethical consumers share their leftover food with other people. In many countries, food-sharing platforms were established to help people share their leftover food. Teng et al. reported in their study that in Taipei, there are many non-governmental organizations such as the surplus food community, the leftover food community, etc using social media to communicate, exchange, and share surplus food (Teng et al., 2021). However, food safety concerns are the main challenge of food-sharing practices. People do not know how the food is stored and cooked leads to a lack of trust in the safety of the food to be shared (Falcone & Imbert, 2017).

Food-sharing platforms operating based on the idea of sharing "leftover" food difficult to be successful because in general, leftovers "are perceived as food that has lost its original qualities and aura" (Cappellini 2009: 370, cited in Falcone & Imbert, 2017). A more proactive plan of food sharing (starting from buying extra ingredients and cooking extra food to share with others) will have more potential. For example, during Ramadan, Muslims in Malaysia will cook extra food and share it with their neighbours. This food-sharing activity of Muslim culture helps build great relationships among neighbours in Malaysia (Mansor et al., 2022).

Co-procurement and co-cooking are the expanding versions of food-sharing that have great prospects in the future of sustainable food consumption practices. Co-procurement means "the activity of buying bulk quantities of groceries together and being shared by relatives, friends, or regional group shopping groups" (Mansor et al., 2022). Co-procurement can help resolve the issue of food waste generated from buying large-packaged products. Moreover, it also allows "households to enjoy special prices for large quantities of stuff" (Mansor et al., 2022).

Co-cooking means "the activity of cooking and sharing meals with someone who lives nearby" (Teng et al., 2021). Co-cooking can help resolve the food waste issue generated by "cooking a lot at one time and then just reheat the food for the next meal" (of busy lifestyle women). Co-cooking also help household reduce food expenses (Mansor et al., 2022) as well as the energy used in food storage and household cooking. These analyses implied the vital role of the sharing economy in transforming to more sustainable food consumption at home. However, as far as I know, while many studies are focusing on food sharing as a channel for sharing leftover food, there are still limited numbers of studies in the literature on study sharing economy (co-procurement, co-cooking) in the food consumption sector.

4.3. Disposal phase

Food waste is a critical issue leading to environmental, economic, and ethical consequences (Bravi et al., 2020). Along the whole the food system, most food waste is generated at the household level (Aydin & Yildirim, 2021; Nguyen et al., 2022), especially in households in developed countries (Parfitt et al., 2010 cited in Nguyen et al., 2022). In the past few decades, the shares of GHG emitted from food waste in developing countries have been rising rapidly (Porter et al., 2016 and Scherhaufer et al., 2018 cited in Abu Hatab et al., 2022). These issues imply that it will be a huge omission if we do not consider food waste issues in sustainable food consumption studies.

4.3.1. Categories and types of food waste

A study by Aydin & Yildirim reveals that meat and fish are the two least wasted categories while fruits and vegetables as well as bread and bakery are wasted the most (Aydin & Yildirim, 2021). Breaking food waste by types, a study by Abu Hatab et al. shows that "leftovers on plates come first (65.2%), followed by over-cooked foods (14.3%), stored foods that ended up unconsumed (13.2%), food bottles opened but were unused (6.6%) and other foods items such as fresh fruit and vegetables (0.7%)" (Abu Hatab et al., 2022).

4.3.2. Actors of food waste

Households with young parents, young children, and high-income waste a lot of food (Stensgård and Hanssen, 2016 cited in Hebrok & Heidenstrøm, 2019; McCarthy & Liu, 2017). Older consumers and households with fewer members are more likely to waste less food (Stancu et al., 2016 cited in McCarthy & Liu, 2017). Low-income households and price-conscious consumers also waste less food because of budget constraints (Koivupuro et al., 2012 cited in McCarthy & Liu, 2017).

4.3.3. Communicating between family members and household food waste

Households with more than one person responsible for food purchasing tend to waste more food because of miscommunication between them leading to purchasing the same food products (Farr-Wharton et al., 2014). In addition, households with bad communication between household members will waste more food. Specifically, "other household members did not always know if leftover ingredients were available, because the leftovers were placed in storage by another household member and were not communicated to others" (Farr-Wharton et al., 2014). Understanding family members' preferences, knowing how much each member of the family usually eats (Hebrok & Heidenstrøm, 2019), what food they like, etc will help the "chef of the family" cook tasty dishes, and serve the right portion per meal, and therefore, reduce household food waste. As far as I know, there are limited studies in the literature investigating these factors.

4.3.4. *Storing food and household food waste*

As mentioned above, some studies in the literature reveal that planned shopping with a shopping list can help reduce food waste. Examining the fridge & pantry to check the food stocks before creating the shopping list is an important step to help avoid food waste. In their study, McCarthy & Liu proved that a high percentage of food was put in the garbage bin because people forgot about food left in the fridge (McCarthy & Liu, 2017). However, consumers with busy lifestyles usually do not plan their food shopping and have no time to check the fridge & pantry before shopping, therefore, they "are more likely to purchase foods that are already available at home" (Ganglbauer et al., 2013 cited in Nabi et al., 2021). Households with women who have full-time employment, high education, high income, and less time to manage food at home are an example of this consumer segment (Mohsenin and Mohajer, 1999; Alibaigi, 2004; Ahmadi Nadooshan, 1991; and Shahnoushi et al., 2012 cited in Lin & Guan, 2021). In a study by Mansor et al., consumers indicated that because of purchasing large-packaged products (cheaper per unit), they end up with waste more food (Mansor et al., 2022). However, if after purchasing, consumers divide these large-packaged products into smaller parts and store them correctly in the fridge with appropriate food containers, they can avoid this issue.

4.3.5. *Reducing financial losses and household food waste*

Reducing financial losses (saving money) is a main motivator to reduce household food waste (Graham-Rowe et al., 2014 cited in Ananda et al., 2023; Lin & Guan, 2021; Nabi et al., 2021). A study by Mancini et al. found that for medium-low educational level consumers, food waste concerns mainly come from economic loss and those consumers are unaware of the environmental impacts of food waste food (Mancini et al., 2017). While organic food consumers are expected to waste less food "to avoid the monetary loss associated with wasting quality food" (McCarthy & Liu, 2017), other studies show that healthy lifestyle consumers are afraid that leftover food harms their health, so they will not eat leftover food (Savelli et al., 2019; van Geffen et al., 2020 cited in Mansor et al., 2022).

4.4. A framework for future studies

Based on what is found from the thematic approach, following, I will propose a framework to evaluate the sustainable food consumption of households in future studies. The sustainable food consumption process in this framework *(see Figure 4)* will start from purchasing ingredients (acquisition phase) to cooking and eating (usage phase) and food waste (disposal phase) *"to meet daily household food needs wisely and environmentally friendly"*. Storing behaviours play an important role in the whole process because good storing practices can help reduce food waste.

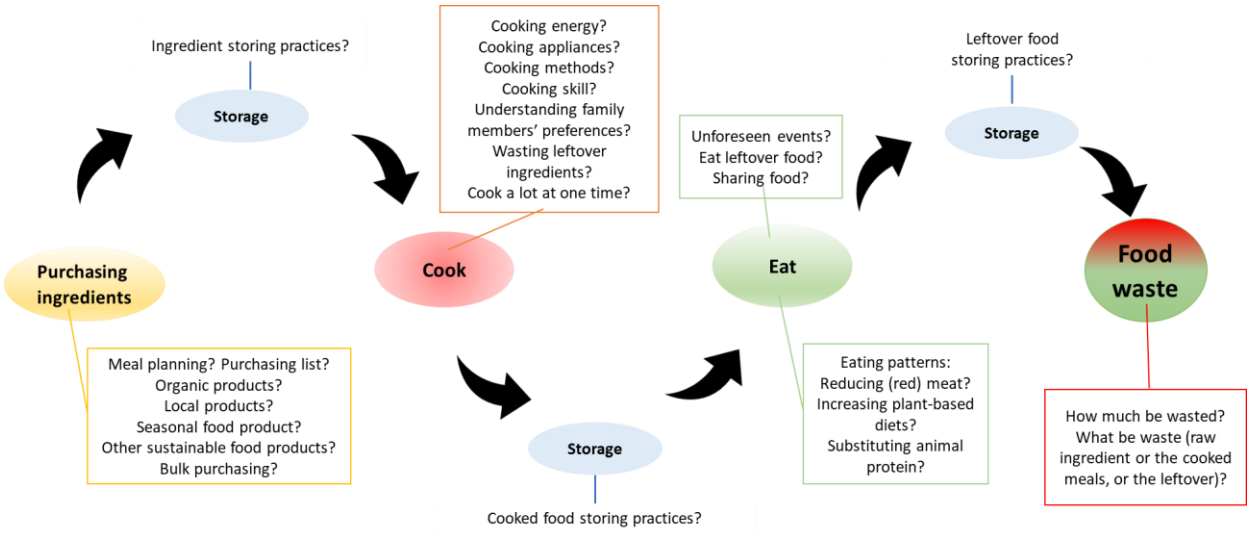

Figure 4: A framework for sustainable food consumption studies

In the acquisition phase, we should start with the question: “Whether or not the households consume sustainable products?”. These sustainable products can be organic, local products, seasonal food products, etc. Another question in this phase is: “Whether or not the households apply sustainable behaviours before and during purchasing food ingredients?”. Sustainable behaviours before purchasing are meal planning and shopping planning with the shopping lists.; the sustainable behaviours during purchasing are avoiding bulk purchasing, avoiding “just in case” purchasing, etc.

The usage phase includes two stages: cooking and eating. In the cooking stage, we should take into consideration: “whether or not households apply sustainable practices in energy use for cooking?”, such as the types of energy and the cooking appliances they use, the cooking methods they apply while cooking; whether are they trying to save energy while cooking; are they cook a lot at one time? Another question that can be asked in this stage is: “Are they good at cooking?”. In other words, the frequency of burnt/ over-cooked food, cooked food that does not taste good, or wasting ingredients while cooking.

In the eating stage, we should ask: “Whether or not households adopt sustainable eating patterns?”. Sustainable eating patterns can be curtailing the quantity of food in portions, reducing (red) meat consumption, or substituting meat with hybrid meat or pulse-based protein. Another question in this stage is: “whether or not households apply sustainable practices in the eating stage?” Specifically, do they eat leftover food, share or eat sharing food, etc.?

Finally, the disposal phase will be illustrated by the food waste issues (how much food is wasted? what kind of ingredients are wasted? As mentioned above, good storage practices can help reduce food waste. Literature shows that bulk purchasing (especially without planning) will contribute hugely to household food waste. However, if bulk-purchasing households preliminary process the ingredients after purchasing and store them properly (for example storing them in glass/plastic containers in the fridge properly), they can avoid food waste generated from their bulk purchase behaviours. Similarly with cooking a lot at one time and treating leftover food, the role of food storing is very important in reducing food waste.

5. Implications

Transforming towards a more sustainable food consumption is considered as an important solution to tackle the rapid increase in food demand and mitigate climate change effects on the food system. Therefore, in the future, I predict that more and more studies regarding these topics will be conducted all over the world.

To encourage the transition to sustainable food consumption of households, policymakers not only should focus on promoting sustainable food product consumption (such as organic food, local food, etc.) but also should take into consideration all stages of food consumption with a final target on reducing greenhouse gas emission of the food consumption process and minimising food waste of households. By referencing the proposed framework in this article, policymakers can build the annual “household food consumption sustainability index” for their countries. They can design the indicators to evaluate the current levels of sustainability in each phase of the food consumption process. By observing these annual household food consumption sustainability indexes (sub-indexes, and indicators), they can have more detailed views of the comprehensive picture, and therefore, can design effective campaigns/ policies to promote sustainable food consumption practices among consumers.

This framework can also contribute to the academic world by driving future studies in sustainable food consumption topics from mainly focusing on purchasing behaviours and sustainable eating patterns to a more comprehensive approach that covers all phases of food consumption with an emphasis on reducing greenhouse gas emissions and minimising food waste of households. Based on the research interests, future researchers in the field can investigate any phase, or smaller stage(s) in each phase of the consumption progress. However, if a researcher is interested in “sustainable food consumption” in general, he/she should incorporate all three phases in his/her study with a focus on food waste generated from this process of food consumption.

6. Conclusions

Inputs of this article mainly come from the Web of Science and Scopus databases and some documents collected Google Scholar search engine, therefore, it is inevitable to miss the relevant documents in the literature. Food consumption includes home cooking, eating out, eating ready-to-eat food/ processed food products, etc. To simplify the content of sustainable food consumption so that can build an easy-to-apply framework for future practitioners (especially policymakers in developing countries), this research only focuses on the sustainable home cooking process of households. This is another limitation of this research.

Food sustains human life, but household food consumption impacts heavily on the environment. To ensure food security and healthy diets for future generations, it is more necessary than ever to transform food systems toward sustainability. Sustainable food consumption is not simply by purchasing sustainable food products. However, a majority of studies in the literature focus on the acquisition phase of food consumption only. In the future, to design policies promoting sustainable food consumption of households, policymakers should investigate the whole food consumption process from acquiring, using, and disposing of food to meet daily household food needs wisely and environmentally friendly.

By covering all phases of food consumption, this research has built a comprehensive framework for future studies on sustainable food consumption topics. Policymakers can easily use this framework to build indicators that support designing effective pro-sustainability campaigns/policies in the food consumption sector. Researchers can reference this framework to conduct more comprehensive studies on sustainable food consumption topics in the future.

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