Deliverable 3.1

CONCEPTUAL FRAMEWORK FOR BEHAVIOURAL CHANGE UNDERSTANDING

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CHORIZO PROJECT

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Conceptual framework for behavioural change understanding

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Executive summary

CHORIZO aims to improve the understanding about how social norms (rules and expectations that are socially enforced) influence behaviour related to food waste generation. In order to provide effective interventions for food loss and waste (FLW) actions, the project conducts a comprehensive analysis and construction of behavioural intervention model building.

Deliverable 3.1 outlines the conceptual framework for behavioural change understanding in the CHORIZO project. This work aims at setting out the theoretical framework which represents the starting point for the modelling activities, which will focus on the effects of interactions among food supply chain actors and the influence of social norms towards zero food losses and wastes (FLW). The theoretical framework will be here presented by first outlining the complexity underpinning social systems – and food systems more specifically – and the methods available to investigate them Then, the MOA and HUMAT behavioural frameworks will be presented: the former considers food waste as an unintended consequence of iterative decisions, adaptation and behaviours driven both by internal and external factors, the latter explores agents' behavioural decision mechanisms. The following section will provide an operational definition of social norms. Finally, the last section will supply a set of challenges and attention points to be considered when incorporating MOA and HUMAT into agent-based models and pave the way forward for the understanding of how social norms influence the generation or reduction of food waste.

The document starts with an introduction on the overall project objectives and structure, and highlights the framework we propose for understanding and exploring behavioural change in the CHORIZO project. In the following chapters (2 to 6), complex social systems, social norms, and model construct are explained. The document ends with a conclusion and steps to follow to ensure timely attainment of the project's objectives.

Abbreviations and Acronyms

Acronym	Description
ABMs	Agent Based Models/Modelling
EU	European Union
FAO	Food and Agriculture Organization
FW	Food waste
MOA	Motivation-Opportunity-Ability
SN	Social Norms

1. Introduction

The Chorizo Project ("Changing practices and Habits through Open, Responsible, and social Innovation towards ZerO food waste") is a Horizon Europe, European Union (EU) funded project, which aims to improve the understanding about how social norms (rules and expectations that are socially enforced) influence behaviour related to food waste generation. Behaviour change is a critical aspect of addressing food loss and waste (FLW) challenges as it is the result of multiple and interconnected behaviours taking place at different moments and stages of the food supply chain.

However, understanding societies as complex systems demands more than just an understanding of individual behaviour. Individual behaviours and choices are not the only aspect that matter when it comes to food waste generation. Indeed, social norms play a crucial role and individuals, with their collective behaviours, keep social norms static or make them changing in time, selecting different norms according to pay-offs. In the interest of understanding social norms and their link with food waste related behaviours, the definition of a theoretical framework is necessary to conceptualise and represent the decisions and actions of individuals along the food supply chain.

To do so, this report explores and adopts an operational definition of social norms, including reference and target groups, gender norms, individual and institutional social norms. The core objective is to identify key characteristics of social norms that need to be included. Also, this work integrates Motivation-Opportunity-Ability (MOA) and HUMAT frameworks. The MOA considers food waste as an unintended consequence of iterative decisions and behaviours driven both by internal (individual) and external (social and societal) factors. HUMAT is a dynamic model that explores human behaviour and adaptation to both social and non-social cues. The model aims to understand why agents make decisions by analysing the individual motives that an agent wants to fulfil.

Finally, to better understand and analyse these complex systems, agent-based modelling (ABM) has been chosen in the context of CHORIZO project as the complex system simulation architecture to understand the interaction between social norms, individual and collective behaviours and represent different food chain actors and segments.

This deliverable has six chapters, in addition to the Introduction and the Conclusion. An overview of the established method for describing social systems complexity is first provided, outlining complexity and its methods, as well as complexity in food systems and the necessity of a theoretical framework. Chapter three is an in-depth analysis of operational definition of social norms. Two chapters are dedicated specifically to the behavioural change model. The first of those (chapter four) provides Motivation-Opportunity-Ability framework, HUMAT framework, and how MOA and HUMAT integrate together by different entry points, while the other (chapter five) is representing social norms through HUMAT and MOA in ABMs. Chapter six discuss conclusion remarks, to follow to ensure timely attainment of study objectives.

2. Navigating the complexity of social systems

2.1 Complexity and its methods

The study of a society requires understanding the intricate nature of individuals and the dynamic interactions that shape social behaviour. Individuals possess diverse preferences, values, abilities, and resources, and are engaged in activities such as imitation, socialization, and trade. They constantly adapt, reconsider, and organize themselves.

While individuals are “complicated”, the society they form is “complex”: its intricacies are shaped not only by the behaviours of the individuals within it but also by the emergent properties born from their interactions. These interactions can result in feedback loops, chaotic dynamics, and tipping points, all of which further influence individual behaviour and either undermine or reinforce societal trends. Therefore, understanding societies as complex systems demands more than just an understanding of individual behaviour.

Complex systems in general are defined as a collection of objects or agents which interact with one another such that the collective behaviour of the system is different from the aggregation of the behaviour of the individual parts (Torres et al. 2021). In recent years, the study of complex social systems has gained significant attention to describe phenomena across various disciplines, including social sciences, economics, and computer science.

Complex systems, like societies, are inherently difficult to predict and model, yet it is essential to do so to effectively navigate the myriad of global challenges. To study complexity, particularly given its analytical challenges, computer simulations have proven to be an effective tool for modelling these complex systems.

Three popular options for complex system simulation architecture include cellular automata, network models, and agent-based models (ABMs).

Cellular automata, which consist of interconnected finite-state machines, represent a straightforward yet effective approach for investigating and understanding complex systems. Here, each individual entity can exist in one of several states, updating it each time step based on its current state and its neighbours’ states. Despite the simplicity of this simulation architecture, cellular automata have been widely used for modelling self-replicating processes in physics and chemistry, due to their capacity to generate realistic patterns and behaviours.

Network models, on the other hand, can be thought of as an advanced form of cellular automata, where neighbourhoods evolve from geographically-based entities to tree-structured formations. In network models, individuals become nodes of a graph, with the graph’s edges representing potential communication links. Network models often serve a dual purpose. They are used statistically to understand existing network structures, such as connection densities, node distances, and centrality measures. Additionally, they can also act as dynamic models to explore various social phenomena like opinion dynamics and information sharing.

ABMs present a more intricate form of simulation in the exploration of complex systems. Unlike cellular automata, where individual components have a simpler state structure, ABMs encompass components characterized by multiple features and can interact through various

networks and pathways. ABMs simulate the actions and interactions of autonomous agents within a specified environment. Each agent has a set of rules or behaviours that guide its decision-making process, and these rules can be as simple or complex as necessary to capture the desired level of realism. The agents can have different characteristics, such as goals,9egislati, and learning capabilities, which enable them to adapt and evolve over time.

The distinguishing strength of ABMs lies in their versatility to simulate complex interaction processes between agents. Take, for example, an epidemiological agent-based model, which can simulate numerous modes of disease transmission along with various policy measures aimed at halting an epidemic. However, this enhanced flexibility does come with a trade-off. Primarily, ABMs are typically implemented via object-oriented programming, which is more difficult and time consuming. They also present a greater challenge when attempting to fit them directly to data. Despite this, their ability to capture nuanced interactions in complex systems still make them a valuable tool in the modelling and understanding of societal complexity.

Therefore, they are the chosen complex system simulation architecture to understand the interaction between social norms, individual and collective behaviours and represent different food chain actors and segments.

2.2 Complex dynamics of food systems and food waste

The concept of "food system" encompasses all the various practices, institutions, resources, stakeholders, and undertakings that are interconnected with how societies arrange and oversee the production and consumption of their food. In a broader sense, adhering to the definition put forth by the Food and Agriculture Organization (FAO), food systems "*encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption, and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded*" (FAO 2018).

This definition introduces critical components that expand upon the narrower concept of food supply chains, entwining them with the more extensive economic, environmental, and social context within which they function. The term "system" inherently suggests the presence of interconnections among different elements, which, in this case, are the food supply chains and all the dimensions, drivers, actors, and outcomes that either exert an impact on, or are melded by, food production and consumption actions. Food systems function across various spatial and organizational scales (Schipanski et al. 2016), and effective interventions or assessment procedures ought to account for synergies and trade-offs occurring among actors and segments of food systems.

As emerges from this definition, food systems are considered as complex socio-ecological systems involving multiple interactions between humans and the environment. Understanding their dynamics as well as identifying and modelling the properties of food systems will help to track progress towards sustainability, including food waste reduction, and set policies that encourage positive transformations influencing actions, behaviours and outcomes of food systems (Allen and Prosperi 2016).

These complexities also come into play when examining the issue of food waste, which accounts for approximately one third of total food production (UNEP 2021), with 17% of the global food production, equivalent to 931 million tons, wasted annually in the final stages of the food supply chain: 61% at the household level, 26% from the restaurant sector, and 13% at the retail level. Food waste occurs in multiple parts of the food system with different drivers and mechanisms. It is possible to divide the main causes into three categories, depending on their complexity and relationship with different stages of the supply chain. Following HLPE 2014 we can distinguish:

- Micro causes: These are causes that occur within each specific phase of the food supply chain due to actions or inactions of agents within that phase;
- Meso causes: These are secondary or structural causes that originate in a phase different from where the waste occurs. They arise due to interactions among agents or due to the existing infrastructure where food is produced, distributed, or sold;
- Macro causes: These are based on the dynamics of the entire food system. They are systemic issues that influence the two previous levels (micro and meso), such as political conditions in terms of regulation or the functioning of the food system.

This distinction helps to understand that despite a significant portion occurring at consumer level, food waste causes cannot be solely attributed to the behaviour of the consumer. However, when investigating behaviour, the understanding that food waste is usually an unintended consequence of iterative decisions and behaviours (Vittuari et al. 2023), and the result of a complex interplay of various factors. Moreover, addressing food waste not only has direct implications for consumers (e.g., changes in budget, food consumption, and health effects) and producers (e.g., pricing, total production requirements, logistics) but also induces indirect effects. Each adjustment or adaptation made by affected individuals cascades through the rest of society, triggering further adjustments along its various dimensions.

Despite its challenges, this complexity provides a framework for effectively studying seemingly intractable problems within food systems. The primary components that need to be understood are the individual entities and their interaction dynamics. By accurately identifying these interactions within a food system, simulation methods can allow societal patterns to “emerge”. Importantly, studying these simulations can provide valuable insights on how to influence the real world effectively.

To identify the boundaries, the characteristics and the actors of the food system considered is the first step to model their dynamics. Theoretical frameworks, such as MOA and HUMAT described below, provide the essential components required for building the simulations. Acting as blueprints for initializing individuals within a simulation, these frameworks encapsulate validated knowledge derived from psychological and sociological observations.

These frameworks are particularly beneficial when initiating ABMs, as presented below, as the detailed feature sets they describe can typically be integrated directly into the computational structure of an agent-based model.

While various frameworks may emphasize different properties, a comprehensive theory necessitates the description of several key elements pertaining to individuals. These include the

drivers that motivate individuals, the internal mechanisms through which they weigh trade-offs between options, and how they internalize external constraints. Additionally, a sound theory must also account for the impact of others on an individual. It should encompass factors such as who an individual interacts with, the information available to them, the actions they can take to influence others, and how the opinions of others influence their personal decisions.

By employing theoretical frameworks and incorporating these essential components into simulations, researchers can gain a deeper understanding of the complex dynamics at play within food systems. This approach enables the exploration of various scenarios, the testing of interventions, and the formulation of strategies to address challenges and steer the system toward desirable outcomes.

Section's highlights

- Societies are complex systems, shaped by individuals and objects that interact with each other and whose collective behaviour differs from the aggregation of the behaviour of individuals;
- Agent-based models (ABMs) have proven effective for investigate complex systems by simulating the interactions of autonomous agents whose behaviours follow specific rules within a specific environment;
- Food systems are complex socio-ecological systems involving multiple interactions between actors;
- Food waste is the consequence of a set of intended and unintended behaviours, occurring in different stages of the food system and specific theoretical frameworks are required in order to untangle this complexity.

3. Theoretical frameworks to untangle complexity

3.1 The Motivation-Opportunity-Ability framework

The food waste literature in recent years has been focusing on consumer behaviour, following the idea that stimulating behavioural change might ensure a significant contribution in terms of food waste reduction. Food waste is the result of multiple and interconnected behaviours taking place at different moments and stages of the food supply chain (Quested et al. 2013; Setti et al. 2018; van Geffen et al. 2016) and a comprehensive theoretical framework to classify and organise behavioural drivers is necessary.

The MOA framework considers **food waste an unintended consequence of iterative decisions and behaviours driven both by internal (individual) and external (social and societal) factors** (Vittuari et al. 2023). Initially designed for marketing research (Rothschild 1999), the MOA framework (Fig. 1) was proposed in 2016 within the EU Refresh project to systematically analyse drivers of food waste behaviour. According to the MOA framework (MacInnis et al. 1991), **consumers' information processing and consequent decisions are**

mediated by personal motivations, opportunities, and abilities. While being related to the personal sphere, the context in which consumers live deeply influences those drivers.

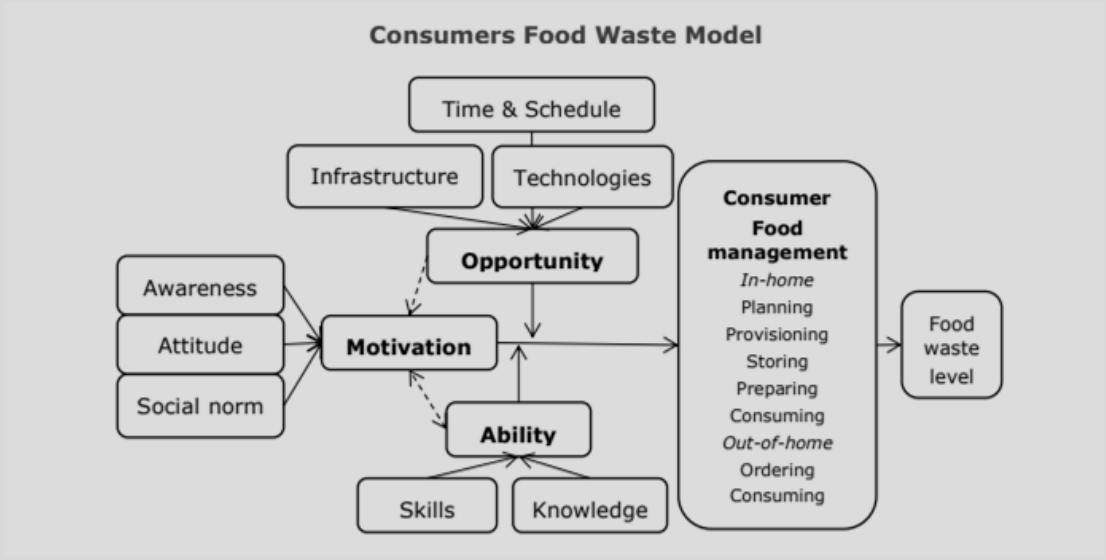

Figure 1 MOA framework – source: (van Geffen et al., 2016)

Motivations (see Table 1) represent the intentions of one or more individuals to carry out a set of actions. Their role in avoiding or reducing food waste relies on their positive/negative effects on attitudes towards the goal (e.g., how people think and feel about wasting food) (Russell et al. 2017; van Geffen et al. 2020a). Attitudes, and consequently behaviours, towards food waste are influenced by the awareness about the problem and the consciousness about global impacts related to food waste (Abeliotis et al. 2014; Russell et al. 2017). Motivations relate also to the perception over the degree of control, the capability of establishing or changing a behaviour, and the effectiveness consumers can have in minimizing food waste (Ertz et al. 2021). Awareness, emotion and engagement such as concerns around health and environmental issues and preferences towards healthy diets are also crucial in driving motivations towards food waste minimization (Russell et al., 2017; van Geffen et al. 2020b). A particular set of motivations are represented by social norms since individual behaviour is influenced by what other individuals do (descriptive social norms) and what individuals think others expects from them (injunctive social norms) (Vittuari et al. 2023). Why social norms are such important drivers in understanding food waste related behaviour will be explored in the following cha

Ability (see Table 1) represents the capacity of each individual in dealing with the creation, management, and reduction of food waste by relying on personal knowledge and skills. Drivers included in this category span from planning and organizational skills, to purchasing ability, food preparation and knowledge about proper storage, and the capacity to assess food safety via labeling (Bravi et al. 2020; Neff et al. 2019; van Geffen et al. 2020b; Vittuari et al. 2021). With this respect, knowledge and skills on date labelling and on the estimation of food edibility, as well as knowledge about optimal storing techniques, are some examples of abilities related to food waste (Vittuari et al. 2021).

Opportunity (see Table 1) is defined as the possibility of one or more individuals in accessing external material and non-material resources such as time, technology, and infrastructures. This can include physical access to food production, distribution, and consumption, and more in general the access to food services (e.g., the availability of storing and/or cooking tools). Other non-material resources refer to time availability for food-related activities or the habits in managing cooking or storing activities (van Geffen et al. 2020b; Vittuari et al., 2021). Indeed, lifestyles and routines are decisive in driving households' food waste trends (Hebrok and Boks 2017) as well as cultural influences, both in terms of cookery and traditions.

It Is worth including not only opportunities at individual level but also to consider legal and regulatory frameworks that might impose requirements like food safety and quality standards, animal welfare, and waste taxation policies (Canali et al. 2016).

Socio-demographic characteristics are considered to have an indirect influence on food waste behaviours, and, differently from previous drivers, are hard to be changed or be influenced by any kind of intervention. Regarding gender, food waste research studies have not generated consensus on the role it has on food waste generation at individual level: some studies like Secondi et al. (2015) found that males waste more than females, and that females tend to have more positive attitudes towards the reduction of fruit and vegetable waste (Graham-Rowe et al. 2015), while others suggest no significant gender effect (Principato et al. 2015) or even that women tend to waste more (Visschers et al. 2016).

Table 1 Examples of food waste drivers in the MOA framework

Behavioural factors		Examples of food waste drivers	References
Motivation	**Psychological factors/ individual motivations**	Attitude (e.g. Media-induced environmental attitude; personal attitudes towards food waste)	Abeliotis et al., 2014; Russell et al., 2017; Graham-Rowe et al., 2015
		Awareness/perception of consequences of food waste	van Geffen et al., 2020a; Parizeau et al., 2015
		Perceived control, Perceived consumer effectiveness	Setti et al., 2018; Graham-Rowe et al., 2015; Ertz et al., 2021
		Emotions and engagement (e.g. Risk preferences, healthy diet, enjoyment of food)	Russell et al., 2017; van Geffen et al., 2020a; Birau and Faure, 2018
	Norms	Social norms (injunctive norms; descriptive norms)	Schanes et al., 2018; Elhoushy, 2020
		Personal norms (e.g. Subjective views on food waste; non-readily changeable behaviours)	Evans 2012; Graham-Rowe et al.2014; Hebrok and Boks, 2017
Oportunity	**Micro level**	Time (e.g availability), schedule (e.g purchase planning) or lifestyle	Silvennoinen et al., 2014; Stancu et al.,2016; Vittuari et al., 2021; Hebrok and Boks, 2017
		Food environment (e.g. availability of tools and technologies)	van Geffen et al., 2020b

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	Macro level	Legal and regulatory framework (e.g.inefficient14egislationo, food waste dedicated policies)	Boulet et al., 2021; Canali et al., 2016; van Herpen et al. 2019; Kasza et al., 2019)
Ability	**Capabilities**	Skills	van Geffen et al., 2020b; Bravi et al. 2020
		Knowledge	Vittuari et al., 2021; Neff et al., 2019

Source: Vittuari et al. (2023)

3.2 The HUMAT framework

HUMAT is a dynamic model that explores human behaviour and adaptation to both social and non-social cues. The model aims to understand why agents make decisions by analysing the individual motives that an agent wants to fulfil. Whenever an option satisfies some motives but not others, the agent will experience a dissonance. Whenever the dissonance is too large, agent experiences a "dilemma" and will try to resolve it by interacting with other agents to either persuade them or learn from their experiences (Figure 2).

The motives of agents are aggregated into three groups: "**experiential" needs, "social" needs, and "values"** Experiential needs pertain to the intrinsic qualities of a choice, such as the preference for food with good taste. Social needs, on the other hand, relate to the level of shared agreement of the agent's choice to the rest of its ego network. Lastly, values represent the moral positions that agents strive to uphold independently of social or experiential motives.

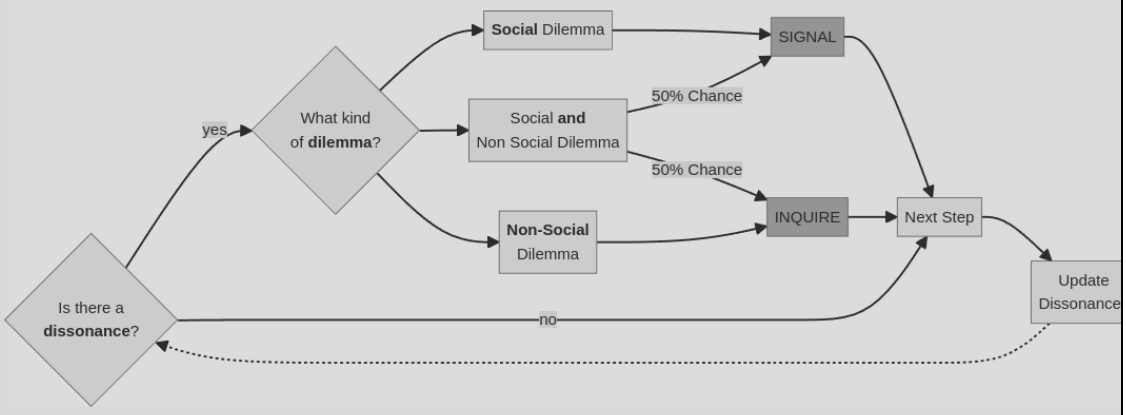

Figure 2: HUMAT dilemmas dynamic

The specific number of individual motives within each group varies depending on the application and the model being employed. Mathematically, each motive is represented by a numerical weight, known as its "importance". This "importance" value determines the relative strength of a motive in comparison to all others. Agents experience dissonance when their choices involve motives that are both satisfied and unsatisfied. For example, discarding leftovers may satisfy the social need of conformity but conflict with the value of environmental friendliness. Agents can tolerate small degrees of dissonance, but larger discrepancies create "dilemma" that prompt agents to strive for consistency between their beliefs, social networks, and decisions. Agents

facing social dilemmas, where their social motives are unsatisfied, will signal. Signalling refers to an agent's attempt to convince others within their ego network by influencing their experiential and value motives to align more closely with their own. On the other hand, agents facing non-social dilemmas will "inquire". Inquiring involves seeking inspiration from their ego network and modifying their own experiential and value motives to better align with those of others.

Section's highlights

- According to the Motivation-Opportunity-Ability framework (MOA), actors' decisions are mediated by personal motivations, opportunities, and abilities;
- HUMAT is a dynamic model that aims to understand why agents make decisions by analysing the individual motives that an agent wants to fulfil; whenever an option satisfies some motives (experiential needs, social needs, or values) but not others, agents experience a "dilemma" that needs to be solved.

4. Social norms in complex systems

4.1 An operational definition for social norms

As stated before, the most recent focus of food waste research has been on behavioural drivers of food chain actors (Aka and Buyukdag, 2021). Although the influence of social norms has been explored some contexts, the link between social norms and food waste related behaviour is only now beginning to draw attention (Stangherlin et al. 2021). Social norms play a crucial role in addressing the issue of food waste and loss. These norms are the unwritten rules and expectations that guide people's behaviour within a society or group. In the context of food waste and loss, social norms influence individual'' attitudes, beliefs, and behaviours related to food consumption, preservation, and disposal.

Pivotal to the achievement of the project's aim to improve the understanding of how social norms influence behaviour and FLW generation is the sharing of a common applicable definition of social norms. Starting from the work of Bicchieri (2006), the following definition is adopted:

Social norms are rules/guides for **actions**[1]. Individuals aspiring/belonging to the **norm's target group** (i.e., the in-group):

- Usually accept the social norms as guidance for actions;
- Expect the normative actions from other in-group members;
- Perceive normative actions as expected of them by others[2].

[1] According to Max Weber's Theory of Social Actions, actions are considered as meaningful behaviours (behaviours also include reflexes).

[2] It doesn't really matter if others actually expect it, as long as the individual thinks they do.

Firstly, social norms shape individual'' perceptions and attitudes towards wasting food. Norms that prioritize frugality, resourcefulness, and the avoidance of waste can discourage excessive food waste. Conversely, if there are norms that accept or even encourage wasteful behaviour, such as discarding edible food without thought, it can perpetuate a culture of waste.

Secondly, social norms influence the behaviour of individuals in social settings. People often conform to what they perceive as acceptable or expected within their social groups. If wasting food is normalized or considered socially acceptable, individuals may be less motivated to take actions to reduce food waste. However, if there is a prevailing norm that promotes conscious consumption, efficient storage, and donation of surplus food, it can foster collective responsibility and encourage waste reduction efforts.

Moreover, social norms can also affect the behaviour of businesses, organizations, and policymakers. If society places value on minimizing food waste and loss, there is increased pressure for businesses to adopt sustainable practices, such as improved supply chain management and donation initiatives. Similarly, policymakers may be more inclined to develop and enforce regulations and policies that incentivize waste reduction if it aligns with societal norms and expectations.

In summary, social norms are important in the context of food waste and loss because they shape individual behaviour, influence social dynamics, and can drive systemic changes. By promoting norms that prioritize conscious consumption, efficient resource management, and collective responsibility, society can work towards reducing food waste and creating a more sustainable food system

The definition above entails a distinction between behaviours and actions, the latter understood as meaningful behaviours: "*By 'action'' is meant human behaviour linked to a subjective meaning on the part of the actor or actors concerned […] Such behaviour is 'social' action where the meaning intended by the actor or actors is related to the behaviour of others, and the action is so oriented*" (Weber 2019, p.78-79). Actions include positive actions (i.e., doing something) and inhibition of actions (refraining from doing something). Social norms can have a **prescriptive** (should), a **proscriptive** (shouldn't) or a **permissible** (can, action is acceptable but not obligatory) character, and may additionally specify a context to which the social norm applies (e.g., one should wear black to a funeral). Following social norms reflects (and signals to others) the target group affinity.

Injunctive social norms are commonly distinguished from descriptive social norms. Injunctive social norms are perceptions about what kind of behaviour is approved or disapproved by the reference group in a specific context (i.e., what is normatively appropriate); descriptive social norms refer to prevalent or common behaviour that is perceived to be effective in a given situation, and they reflect perceptions about the likelihood that others engage in the normative behaviour themselves (Cialdini et al. 1991). Hence, when the social norm has **a descriptive character** (i.e., descriptive social norm), individuals perform the normative action because of its perceived effectiveness, rather than because of the perceived expectations of others. In descriptive social norms, the target group can be incidental, and the norm can quickly lead to an

emergent action. When the social norm has **an injunctive character** (i.e., an injunctive social norm), (dis)approval of (non)conformity via reward or punishment reinforces the normative action. For instance, observing the members of the target group conforming to the norm (and possibly receive a reward for conformity) or/and seeing the members of the target group punished for non-compliance provides validation that the norm exists.

This distinction comprises the **concept of anonymity and morality** in relation to individual behaviours and actions: norms related to morality are always followed while other social norms are not followed when the action is anonymous, i.e., when people believe they are not seen. Injunctive social norms are more likely to incorporate a dimension of morality, which compels individuals to act in a certain way even though their action is private. If a social norm has a moral character for an individual (i.e., a moral social norm), it is related to a value(s) (standards of good or bad) the individual perceives as important. This analytical differentiation will be taken into consideration in the investigation of social norms, as the empirical expectation dimension of social norms is here distinguished from the normative one and the role of anonymity.

This is also related to the concept of internalization, defined as the process of transforming motivations of agents for complying with social norms from those of external reward or punishment to that of following norms as an end in themselves (Andrighetto et al. 2010). If a social norm is internalized by an individual, it is more likely that the norm will be followed even if the action is private.

While some scholars have suggested that norms regulate only interdependent actions (Goldstein, Cialdini, and Griskevicius 2008; Lapinski and Rimal 2005; Schmidt and Rakoczy Forthcoming) others argue that they inform independent actions as well (Cislaghi and Heise 2018; Gelfand, Nishii, and Raver 2006). Independent actions do not require collaboration with others to be carried out (e.g. brushing your teeth at home). Interdependent actions, instead, require coordination between individuals to achieve one's goal (e.g. organising a marriage ceremony) (Van Lange and Balliet 2014).

When identifying an applicable social norm, the focus lies on the following topics for their categorization:

- Action: What action does the norm refer to?
- Type of social norm: Is the norm prescriptive, proscriptive or permissible?
- Scenario: Does the norm apply to any specific context/scenario (e.g., gender, culture, region, situation)?
- Target/Reference group: Who is the target group that should follow the norm? Role of anonymity: Is the normative action observable?
- What is the fraction of the target group that follows the norm?
- Is there a reward for following the norm? Is there a punishment for not following the norm? If yes, what forms do the rewards and/or punishments take? Who administers the rewards and/or punishments?

In the upcoming sections, key aspects of social norms that are important to consider when implementing them in ABMs will be explored. Before delving into the intricacies of the

implementation, it is essential to describe and define these aspects. The focus will primarily be on the reference and target groups, the classification of social norms and actions, their connection to gender, and the distinctions between individual and institutional norms.

4.2 Reference and target groups

It is crucial to identify the **reference and target groups** of social norms, as well as the social networks involved. This identification is essential because it helps to identify the type of social norms a group conveys, and to measure the level of individual'' attachment to these reference groups. **Reference groups** refer to people that expect a specific behaviour from people. In other words, they are the people whose attitudes and behaviours are considered essential when one is deciding on their own behaviours and actions. **Target groups** instead include individuals that perform the action regulated by the social norm.

When social norms are in place, an individual who perceives themselves as a member of the norm's target group feels that a certain action is expected from them as a group member. This expectation is conveyed by the fact that most members of the target group follow the norm, providing empirical validation if the action is observable, or by the believe that most members think they ought to follow the norm (normative expectation). In some cases, even non-group members may expect the action from members and may reward compliance and punish non-compliance. Starting from this definition, the main focus is on **perceived expectations**: it does not matter if others actually expect a certain action to be performed, as long as the individual thinks they do.

Table 2: Social norms examples

	Example 1	**Example 2**	**Example 3**	**Example 4**
Social norm	Good provider identity	The portion size is influenced by what others serve themselves	Food of undesirable aesthetic quality pose a risk to health	Children must clean the plate as parents paid for it
Context/Scenario	Households	Buffet (restaurants, hospitality)	Food banks	Schools
Target group	Food routine manager	Customers	Donors	Pupils
Reference group	Family members	Other customers	Clients, NGOs	Teachers and parents
Anonymity	Public	Public	Public	Public
Type of social norms	Prescriptive (should)	Permissible (can)	Proscriptive (shouldn't)	Prescriptive (should)
Social norm character	Injunctive	Descriptive	Injunctive	Injunctive
Reinforcement mechanism	None	Reward (social acceptance)	Punishment (reputation)	Punishment

4.3 Gender norms and social norms

Social norms might be highly gendered, meaning that target groups can be gender specific. On the other hand, social norms and gender norms differ in terms of conceptualization and operationalization (Cislaghi and Heise, 2020).

Gender norms are the social rules and expectations that build a gender system: they refer to the societal expectations and standards regarding the behaviours and roles considered appropriate for individuals based on their perceived gender. They are embedded in society and can vary widely across cultures and time periods; they are reproduced by people's actions and enforced by social institutions, power dynamics, and peoples' compliance. Gender norms mirror and preserve inequitable power relations, often to the disadvantage of women. According to the literature, gender norms are just one of the different elements constituting a gender system, along with gender role, gender socialisation, and gendered power relations (Cislaghi and Heise, 2020).

In contrast, social norms exist within people's beliefs, shaped by their social experiences and interactions with others' approval and disapproval. They encompass a wide range of behaviours beyond just gender-related expectations and reference groups of social norms have more precise boundaries than those of gender norms. Additionally, social norms do not necessarily benefit anyone (Cislaghi and Heise, 2020), even if in the literature there are some findings showing that in some cases following social norms brings about positive payoffs or allow for avoiding negative payoffs (Andrighetto et al., 2013; Fehr and Fischbacher, 2004; Gross and De Dreu, 2021). In these cases, following the norm is related to the social punishment that would derive from not following it, in terms of image, trustfulness, and cooperation with others.

This distinction is quite relevant when discussing interventions aimed to change these norms to improve benefits for society: changing gender norms requires changing institutions and power dynamics while changing social norms can requires only changing people's misperceptions of what others do and approve of in their reference group, even though misperceptions can be influenced by gender (Cislaghi and Heise, 2020). For example, historically the purchase of food and preparation of meals in the home has fallen mainly to women (Bowers 2000, Langard and Caraher 2001, Korsvik and Rustad 2018, Bowen et al. 2019). On the other hand, the "*good provider identity*" and the influence it has on the generation of food waste is not strictly connected to gender even though its role within a household context might be.

Section's highlights

- Social norms are rules/guides for actions. Individuals aspiring/belonging to the norm's target group (i.e., the in-group): usually accept the social norms as guidance for actions; expect the normative actions from other in-group members; perceive normative actions as expected of them by others;
- Social norms' reference groups refer to people that expect a specific behaviour from people. Social norms' target groups include individuals that perform the action regulated by the social norm.

5. Integrating theoretical frameworks into modeling: challenges and entry points

5.1 Defining integration challenges

Translating the MOA framework to the HUMAT framework presents several key challenges. While there are strong commonalities between these theories, they also exhibit distinct differences in their dynamics and the ancillary data required for their implementation.

Firstly, it is crucial to recognize the core similarities between the two frameworks: both the MOA and HUMAT theories centre around decision-making and behaviour. They share the common characteristic of decomposing decisions based on individual drivers and levers. Additionally, both theories typically focus on discrete, often binary, decision-making processes. Both the MOA and HUMAT theories include "social norm" as one kind of “motivation” that drives human behaviour. In HUMAT, social norms appear either as "social motive" or "values" A "social motive" refers to the situations where the power of social norms rests heavily on the fear of group disapproval. In these cases, following the norm is less of a personal decision and more of a strategy to avoid social “punishment”. Conversely, social norms fall under the "values" category when individuals have internalized these norms. They have accepted them as part of their belief system or see them as a crucial aspect of a social role they aspire to fulfil. This distinction partially mirrors the classification of social norms as "descriptive" and "injunctive," respectively. In some cases, however, the internalization of injunctive social norms can be influenced by anonymity.

However, the disparity lies in their primary areas of emphasis. The MOA framework can be regarded as a pure decision-making theory, aiming to break down the underlying drivers that influence an individual's behaviour. On the other hand, the HUMAT framework primarily addresses dilemma-driven behaviour on the basis of the agent’s motives (i.e., needs, desires and/or reasons). It explores how, post-decision, agents navigate and mitigate cognitive dissonance.

Simply put, while the MOA framework provides a detailed snapshot of the drivers behind a decision, the HUMAT model is a dynamic process that follows the agent's actions and strategies post-decision. In the HUMAT paradigm, agents attempt to reconcile their dilemmas by engaging with others - persuading them, gathering divergent information, or updating their own perspectives. Consequently, HUMAT simulations encompass a process that extends beyond the snapshot provided by surveys and MOA analysis.

Connecting the static MOA framework to the dynamic HUMAT framework presents a significant challenge, particularly in understanding the nature of the "snapshot" that MOA represents. A crucial question arises regarding whether MOA surveys, which decompose motivations, serve as the start or the endpoint for a HUMAT-driven simulation.

- If the MOA survey is perceived as a 'starting condition’, MOA elements could be mapped onto HUMAT's ones and then start the simulation. The issue would be to explain here why the snapshot provided by the surveys was unstable and at what speed will it disappear

- Conversely, if the MOA survey is regarded as an 'endpoint,' the HUMAT simulation must be structured to ultimately produce survey results as an equilibrium. This approach's key challenge lies in discerning the initial conditions that led to the final configuration of preference and decision-making.
- A potential alternative would be to view the survey results as both the starting and ending points, assuming the surveys reflect equilibrium behaviour in the absence of policies. In this case, HUMAT simulations must be structured to commence and conclude within the configuration outlined by MOA's surveys.

Once the nature of the connection is established, the first fundamental mapping involves translating MOA's motivation, opportunity, and ability into the motives of the HUMAT model, categorizing them as experiential, social, or value-related. However, this mapping is not a simple one-to-one correspondence, as some abilities and opportunities may not directly align with a motive in HUMAT but rather contribute to the numerical importance of the original motive.

For example, motivations can be regarded as the internal state that influences the decision-making processes of actors like the expectations (of reward/punishment/compliance) coming from social norms. Other motivations like preferences or goals can be also considered to provide heterogeneity among agents. Opportunity can be integrated in the models as the environmental conditions, resources, and constraints that affect the decision-making processes. Also, Ability can be used to account for heterogeneity since agents with different levels of expertise might behave different and react to social norms in different ways. MOA's motivation to plan one's meal can be translated into a HUMAT motive, but poor planning (an ability) or a significant distance from shops (an opportunity) would manifest in HUMAT as a lower numerical importance for the original motive rather than new motives themselves. This nuanced mapping between MOA and HUMAT emphasizes the need to carefully consider the relationship between abilities, opportunities, and motives to ensure accurate representation and simulation outcomes.

Another critical aspect to address in connecting MOA models to HUMAT models is the inclusion of social networks within the HUMAT framework. Social networks naturally align with the concept of a 'reference group' in the working definition of social norms presented in this document, but their integration necessitates the imposition of a specific structure governing how agents within the reference group connect. The concept of "ego network" in the HUMAT theory gives a visual depiction of the reference group related to a specific social norm. It reflects who the individual looks towards when gauging how to behave according to these norms. Gathering such data or making these assumptions typically falls outside the scope of the MOA framework.

Furthermore, in HUMAT, the network structure is often dynamic, with agents actively forming new connections to mitigate social dissonance. However, this dynamic nature may not be suitable for certain scenarios under study, such as decision-making within a limited timeframe, like individuals deciding what to choose from a lunch buffet. In such cases, the interaction time may be too short for networks to adapt and adjust. Additionally, it may not be appropriate for social norms where agents anticipate the judgment of others without the ability to escape or form new connections. Thus, considering the context and constraints of the scenario becomes

crucial in determining the appropriate level of network dynamics to incorporate within the HUMAT framework, whether a network is even necessary in some cases.

The translation of these frameworks entails addressing the challenges posed by their varying dynamics and the specific supplementary data required to effectively instantiate them. By understanding and reconciling these differences, researchers can leverage the strengths of each theory and harness the opportunities they offer for a more comprehensive understanding of human behaviour and decision-making processes.

5.2 Setting implementation strategies

The successful implementation of the MOA and HUMAT theories into ABMs requires careful attention to various key aspects. These topics need to be addressed to effectively operationalize the theories and simulate behaviour rather than solely describing it. The focus of attention will be on the following areas:

- **Operationalization**: It is necessary to ascertain how the theoretical constructs from MOA and HUMAT can be translated into practical rules and algorithms that extend beyond the description of behaviour to the simulation;
- **Missing Parameters/Observations**: In some cases, certain parameters or observations necessary for the simulation may be missing. These missing elements can be addressed through calibration, where parameters are estimated based on available data, or by making reasonable assumptions to fill the gaps;
- **Speed Ratio**: It is crucial to establish the appropriate speed between behavioural adaptation and events within the simulation. In other words, the definition of how agents adapt their behaviour in relation to the frequency of pertinent events must be established. For example, determine the rate at which agents adapt compared to the frequency of grocery shopping trips;
- **Non-Binary Decisions and Repeated Decision Making**: To enhance the applicability and realism of the models, it is necessary to adapt the MOA and HUMAT frameworks to handle non-binary decisions and repeated decision-making scenarios. This adaptation will allow for a more comprehensive representation of complex decision processes and capture the dynamics of behaviour over time;
- **Heterogeneity**: Accounting for heterogeneity among agents is essential in capturing the diverse range of behaviours and decision-making patterns observed in real-world scenarios. Incorporating heterogeneity into the models will ensure a more accurate representation of the population and enhance the model's ability to capture various individual characteristics and preferences.

It is important to note that MOA itself is not an operational simulation model. The motivations, abilities, and opportunities derived from MOA do not automatically translate into, for example, a utility function or a set of constraints. On the other hand, HUMAT serves as an operational model, but the mapping that translates MOA into HUMAT is not a univocal nor an automatic process. Multiple valid HUMAT implementations can exist for any given MOA representation, depending on the specific research objectives and contextual considerations.

Furthermore, it is worth mentioning that MOA can also be instantiated without the integration of HUMAT, as demonstrated in the REFRESH project. In this project, MOA surveys were translated into a Bayesian Network statistical model, which leveraged its structure to drive decisions within the framework. This approach showcases the flexibility and adaptability of MOA in different modelling contexts and highlights the range of possibilities in utilizing the theory.

Once a suitable MOA to HUMAT mapping will be established, significant options concerning HUMAT's implementation are still to be faced. These decisions shape the way the simulation depicts the evolution of agent decisions and their social exchanges. Specifically, the following issues need to be addressed:

- **Balancing Adaptation and Decision Frequencies:** how frequently simulated agents will work through their dilemmas and update conflicting motives versus making decisions need to be pinpointed. This directly impacts the relative pace of adaptation against decision-making for each agent.
- **Defining Ego Network Architecture:** The design of the ego network, symbolizing agent social interactions, is up for consideration. In specific uses like a hospitality and catering (HORECA) scenario, defining the ego network could be as simple as identifying who sits together. Yet, more complex situations like weekly grocery shopping decisions can make the ego network definition more elusive.
- **Choosing Network Adjustment Approach:** After establishing an ego network, the technique to tweak this network when agents aim to alter their social ties to minimize discord and exposure to contrasting viewpoints needs to be decided. These algorithmic options shape the network dynamics within the simulation.
- **Calibration of decision-making processes:** Besides choosing the HUMAT model's algorithms, some of its parameters not readily extracted from surveys need to be selected. HUMAT hinges on numerical thresholds that decide whether a dilemma is dismissed or triggers a behavioural change. Moreover, some of HUMAT's motive importance values will not be easily derived from MOA's ability and opportunity definitions. These parameters need to be estimated via calibration. This involves configuring the agent-based simulation to replicate specific aspects of the available data, usually summary statistics related to total waste and other observables. This will allow to estimate and fine-tune the parameters in the HUMAT model by aligning the simulation's outputs with empirical evidence. Further, HUMAT and MOA are primarily designed for binary or discrete decisions. However, in most practical applications, there will be multiple decision points, encompassing binary decisions, discrete options, and even numeric considerations. For instance, in the context of a buffet restaurant, a person's decision-making process involves binary decisions (e.g., whether to go for another round), discrete decisions (e.g., selecting specific items), and numeric decisions (e.g., determining portion sizes). Given this practical complexity, it becomes evident that even when motives are well-defined and HUMAT is utilized, other decisions within the agent-based model will need to be simulated differently. To address this, adaptations to HUMAT may be required to accommodate continuous variable problems and capture the diverse decision-making scenarios encountered in real-world situations.

- **Agents' heterogeneity:** in most simulations, agents will exhibit heterogeneity in their motives and abilities. Simply extracting average behaviour from surveys is insufficient; a complete joint distribution of motives needs to be considered. One approach to generate heterogeneity is by performing resampling with replacement. This involves conceptualizing the survey results as a table, with respondents as rows and their answers as columns. By randomly resampling rows from the survey data, a population of agents can be generated. The resampling process can be weighted via post-stratification if the survey's demographics do not align with the characteristics of the true population. However, careful consideration must be given to introducing an appropriate amount of noise to avoid instances where multiple agents exhibit identical behaviours due to being instantiated from the same survey row.

Alternatively, a more advanced and demanding approach is to employ a synthetic reconstruction method. This entails establishing a dependency structure within the survey responses explicitly (e.g., through hierarchical modelling or auto-encoders) or implicitly (e.g., using Gibbs sampling) and then using this structure to "sample" new agents from a population. This method enables better control over the joint distribution of the synthetic population, allowing for a more nuanced representation of heterogeneity among agents.

5.3 Developing pathways for model selection

Within CHORIZO, five Case Studies are implemented to provide first hand data to generate new evidence on the interaction between social norms, behaviour and food waste.

As described in the "Case Studies Strategic Plan" (see Appendix), they set out a range of different settings, which we can then explore through the modelling. After reviewing the implementation strategies and challenges of models, specific examples of potential implementations within the context of the various **scenarios** under investigation will be provided, utilizing the empirical data that will be collected in the Case Studies.

In the context of household and groceries, the approach entails the analysis of surveys and the conduct of in-depth interviews to statistically cluster households according to common purchasing processes. Through the grouping of households into distinct clusters, the aim is to encompass the diversity of decision-making behaviours. In the simulations, agents are allocated to specific clusters that guide their day-to-day decision-making endeavours. Furthermore, the HUMAT model is utilized by agents to evaluate said clusters, enabling simulated agents to evaluate the clusters they belong to, contemplate transitioning to alternative clusters, or endeavour to influence other agents to join their respective cluster. When it comes to grocery shopping, households must navigate a multi-dimensional decision-making process that involves factors such as quantity, product selection, and shopping location. Instead of directly applying MOA or HUMAT theories to each decision point in the shopping process, which would be impractical, these theories will be considered as a "super-structure" that guides the overall approach and provides a framework for understanding and simulating decision-making behaviours.

Moreover, children both within and out of the household can be influenced by various factors when it comes to food waste. Their social environment, including interactions with family, peers, and school, plays a significant role in shaping their food choices and attitudes toward food waste. This highlights the impact of peer pressure on their food preferences, acceptance of diverse dishes, and the fear of being stigmatized in relation to food waste.

In the context of HORECA simulations (Hotel, Restaurant, and Catering), MOA and HUMAT theories can be directly applied. Three key yes-or-no decisions can be identified: whether to take leftovers home, whether to finish a meal, and whether to order additional food. HUMAT theory can be employed directly for these decisions. However, other quantitative decisions, such as how much to order and which items to choose, will need a statistical approach similar to the one described in the implementation strategies (calibration of decision-making processes).

When considering food banks and organizational donations, the relevance of MOA and HUMAT theories becomes closely intertwined with the influence of institutional social norms. Although it is challenging to model charitable behaviour in profit-driven institutions, altruism can serve as a marketing tool or boost employee morale. Alternatively, managers may feel compelled to uphold charitable practices due to social norms. The applicability of MOA/HUMAT theories increases as the prevalence of this trait is observed in survey data and in-depth interviews.

It is important to note that the outlined plan represents an initial understanding of the most promising modelling paths. As more data will be collected and further in-depth interviews will be conducted throughout the project's development, the methodology will naturally evolve and adapt accordingly.

5.4 Simulating social norms through Agent Based Models

Literature in the field of simulating social norms is fragmented due to the interchangeable use of conflicting definitions of social norms. This is because "simulation" brings together various disciplines, each with its own internal understanding of what constitutes a social norm.

One common approach to studying social norms is through game theory, as demonstrated by Young (2015). In this literature, there is no distinction made between mere coordination, descriptive, or injunctive social norms. Instead, they are all treated as unwritten rules that emerge from individual interactions. The primary focus of this literature is norm formation through repeated strategic interactions. A related earlier strand, as exemplified by Axelrod (1984), also explored norm formation but with the assumption of pure evolutionary dynamics rather than perfectly rational self-adaptation.

Moving beyond the emergence of norms, there are three broad ways in which social norms are incorporated into decision-making processes within simulations. First, social norms can act as constraints, as seen in agricultural simulations conducted by Liu and Ruebeck (2020) and Xu et al. (2020). In these simulations, farmers are introduced to new technologies, but social norms create powerful inertia by hindering adoption when neighbours disagree.

Second, social norms can also serve as extra motivators. This idea is evident in the "planned behaviour" literature (Groeneveld et al. 2017)where social norms adjust the usual standard

utility function. Another direct example is the ostracism simulation by Perreau de Pinninck et al. (2008), where agents decide whether to recommend others based on their previous behaviour, gaining utility by filtering out aggressive individuals.

Finally, social norms can function as a range of strategy profiles that agents can pick from, but their everyday behaviour then relies on simpler rules. A great example is Castelfranchi (1998) where agents in a simulation commit to one of three social norms that then guide their interactions with rivals in a resource use simulation. Another example is Proietti and Franco (2018) study, where social norms define an agent's "type" and its corresponding strategy.

However, in all cases mentioned above, agents do not comply with social norms due to in-group expectations nor norms can change due to external influences. Instead, agents keep the social norms static or may select different norms according to pay-offs. Further, there is no distinction made between descriptive and injunctive social norms, which may be crucial for the way agents selectively adopt or disregard norms. Furthermore, in the context of food waste and loss, social norms tend to be mostly injunctive (based on literature review and empirical research), and thus can be influenced by the individuals' values and beliefs and the in-group's perspective rather than immediate utility or payoff. In the models, the focus will be on injunctive social norms, that are influenced by individuals' values, beliefs, experiences, by reference groups (via social networks), and the environment (e.g., institutions). By doing so, the malleability of norms will be facilitated, ultimately resulting in the establishment of mechanisms and conditions that support the propagation of social norms contributing to the reduction of food loss and waste.

Section's highlights

- In the HUMAT framework, social norms can be considered as social motives, when the power of social norms rests on the fear of group disapproval, or values, when the norms have been internalized by individuals;
- The MOA framework breaks down the drivers that influence individuals' behaviours, while the HUMAT framework addresses dilemma-driven behaviour, investigating how agents mitigate dilemmas stemming from decisions;
- In order to integrate MOA and HUMAT, it must be defined if MOA is the starting or ending point of HUMAT-driven simulations;
- There are three broad ways in which social norms are incorporated into decision-making processes within simulations: first, social norms can act as constraints; second, social norms can also serve as extra motivators; third, social norms can function as a range of strategy profiles that agents can pick from.

6. Conclusions and the way forward

Given the methods and the theoretical frameworks selected to understand the complex interrelation between social norms and specific food supply chains, actors and behaviours within this chain, potential scenarios could be designed exploiting the modelling design. Within the potential scenarios, different drivers behind decisions can be explored and the dynamic process of agent's actions and strategies post-decision will be simulated. Among others, four potential scenarios are described below.

Potential Scenario 1 – Social norms and households food waste: Households are a key target to understand how social norms and social interactions relate to food waste production. In particular, a potential scenario could explore how individuals' roles as good providers influence their decisions related to food consumption, cooking, and sharing within a household. This scenario could explore whether this propensity may lead to more abundant or diverse meals and how this role affects relationships and perceptions within the household context. When food is purchased or cooked, this scenario can help investigating how much the expectation to please and showing care, and if guilt has a role, affects food waste-related choices made by individuals.

Potential Scenario 2 – Social norms and children food waste: Children also can represent another type of actors that could be affected by peculiar drivers regarding food waste. Children develop in a social context and the interactions with their families, peers, and the school learning environment are crucial for their growth and highly influence their food waste and dietary decisions. This scenario could highlight how food waste related actions are influenced by peer pressure with regards to the social acceptance of eating different dishes, the stigmatization or fear.

Potential Scenario 3 – Social norms and out-of-home food waste: Considering other segments and actors of the food supply chain, the role of communication about food waste and the form of serving could be explored in relation to food waste generation out of home, as well as the interaction between employees and consumers behaviour and business practices. Also here, the role of fear, guilt, sense of stigmatization can be explored and compared to the role of positive feelings of caring and belonging in shaping food-related behaviours in out-of-home contexts. Social acceptance of pre-ordering or repurposing ingredients in different forms and at different stages of shelf-life could be explored in relation to food waste generation. Indeed, date marking is often confusing to users and misinterpretations can lead to food disposal earlier than necessary. In relation to social norms, date marking habits perceptions and expectations can influence the decision to consume or waste food.

Potential Scenario 4 – Social norms and food donations: In a food banks' mediated supply chain, food banks play a key role between corporate actors, other NGOs and consumers, requiring the capability of effectively mediating the different food chain actors' motivations and behaviours exploiting the potential of social norms. Understanding what drivers/social norms influence companies in choosing to donate food is vital to move forward with more efficient food bank approaches.

These potential scenarios and research questions will be further developed with a co-creation approach as the information and analysis coming from the data collection of primary information will provide new evidence on the link between social norms and food-related behaviours in different contexts.

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Appendix: List of CHORIZO Deliverables

Deliverable Number	Deliverable Title
D1.1	Data protocol
D1.2	Evidence-based analysis of FLW actions/tools
D2.1	Case studies' Strategic Plans

CHORIZO PROJECT