

Exploring the Nexus of Technology and Food Practices in Young Adults: A Value-Sensitive Design Perspective towards Human-Food Interaction

Melike Balkaya
Design,Technology and Society
Ozyegin University
Istanbul, Turkiye
melike.balkaya@ozu.edu.tr

Gökçe Elif Baykal*
Communication Design
Ozyegin University
Istanbul, Turkiye
elif.baykal@ozyegin.edu.tr

Abstract

This study aims to investigate the dynamics of young adults' food practices within the interplay between technology and tradition by employing a Value-Sensitive Design (VSD) approach as an analytical lens. We conducted surveys and interviews with young adults. This is complemented by a workshop involving design and gastronomy experts. Grounded in Value-Sensitive Design (VSD) and encompassing 38 core values and resulting in five value conflicts. Our analysis highlights five prominent themes: "Preservation of Culinary Heritage and Relationships", "Technological Convenience", "Uniqueness and Personalisation", "Globalised Nature of Food", and "Sustainable Choices and Trustworthiness". By bridging between Human-Food Interaction (HFI) and VSD realms, this study provides insights for researchers, designers, and practitioners. The value-laden analytical perspective of the findings sheds light on the food practices of the young generation, for future HFI design studies blending traditional and technological elements.

CCS Concepts

• **Human-centered computing → HCI theory, concepts and models**.

Keywords

Human-Food Interaction, Value-Sensitive Design, Food Practices, Young Adults

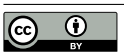
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1 Introduction

Human-Food Interaction (HFI) as a subfield of Human-Computer Interaction (HCI), explores digital and technology-based food practices, extending beyond the foundational principles of HCI [2]. Value-Sensitive Design (VSD), characterized by collaboration among diverse stakeholders at the intersection of technology and society, serves as a framework for insightful examinations of technological innovation [22]. VSD emphasizes the pivotal role of values in the design process and acknowledges the reciprocal influence between technology and human values. This study is grounded on the interplay between HFI and value-sensitive design in a convergence, both contributing to shaping technological development and its impact on human food practices.

Although HCI has important potential to influence food practices and experiences, a technology-driven research agenda—prevalent in the current literature—may impede the exploration of human-food interactions by prioritizing technological efficiencies and novelties over understanding how people engage with food [15]. Some studies within HFI emphasize the importance of hands-on, experimental food interactions and cultural awareness in design [3]. They also recognize how personalized cooking practices contribute to preserving culinary heritage [41], while expressing concerns that innovation could exacerbate societal inequalities [17]. Crucially, dimensions such as creativity, pleasure, nostalgia, gifting, and familial connections are integral to understanding the full scope of HFI [19]. By investigating these elements, HCI can play a pivotal role in designing technology that not only enhances food experiences but also addresses cultural and social dimensions, ultimately offering new ways to enrich and sustain human-food interactions.

This study incorporates Value-Sensitive Design framework into the analysis of Human-Food Interaction (HFI), specifically focusing on the practices of the young adults living independently from their parents. The objective of this study is to examine the intricate interplay between traditional or local elements and technological adoption among the younger demographic in their culinary practices and enhance these practices based on the values of young adults. Specifically, it explores how these individuals engage with and preserve their cultural heritage through the incorporation of technology. This paper seeks to elucidate strategies for leveraging technology and digitalization to enhance and sustain cultural culinary traditions. Our research is based on surveys and semi-structured in-depth interviews with young adults, and a workshop with experts conducted with designers and gastronomy experts to evaluate the research findings from a value-sensitive design perspective. Incorporating values into the design process not only enhances the potential for technical innovation but also holds promise for improving the overall human condition, as suggested by Friedman [22]. Thus, the main contribution of this study is to incorporate value-sensitive design approach as an analytical lens into Human-Food Interaction to investigate young adults' current food practices,



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and present avenues for possibilities and advancements in technology mediated interaction with food by grounded in Schwartz' inventory for describing universal values [39].

2 BACKGROUND

2.1 Influential Factors that Shape Young Adults' Food Practices

Identity development and changing interpersonal influences distinguish young adulthood from other life stages, impacting the adoption of food-related practices [21]. Today, young adults' food practices are heavily influenced by social media and online platforms. For example, food content on TikTok plays a major role in shaping teenagers' perceptions of food and eating habits [44]. While taste is a primary driver of food selection behaviors, other factors like convenience, cost, nutrition, and sensory properties are also influential [26].

Promoting healthy eating among young adults requires making nutritious food both accessible and affordable, alongside providing informative nutrition-related resources to encourage healthier choices [26]. Moreover, comprehensive nutrition literacy, extending beyond basic healthy eating, is emphasized as crucial for empowering healthier food practices.

A related issue is the spread of disinformation, which leads to confusion and poor dietary decisions. Studies have highlighted the limited food safety knowledge among young adults, stressing the need for educational initiatives to improve food handling practices [27] and [24]. Additionally, research indicates that factors such as time constraints affect food preparation habits. Young adults who cook frequently tend to use less fast food and meet their dietary goals more often [30]. Therefore, interventions that teach young adults to prepare quick and healthy meals are important.

Healthy food practices are strongly associated with home food preparation, routine evening meals, and regular breakfast consumption. Conversely, unhealthy habits include media consumption while eating and purchasing foods on campus [31]. Sustainability also influences young adults' food choices; those who favor sustainable production methods are more likely to adopt healthier eating habits [36]. This underscores the growing interest among younger generations in the social and environmental implications of food production.

In summary, understanding the factors that shape young adults' food practices is essential. While technology presents challenges, it also offers opportunities for promoting healthier and more sustainable habits through knowledge and engagement in food preparation. A holistic approach is key to developing design guidelines that positively influence young adults' food practices.

2.2 Human-Food Interaction Research

Human-Food Interaction (HFI) is a relatively new term that encapsulates the intersection of technology and food throughout the food journey, from farm to fork. It is often described as the "interconnection between the self and the food," emphasizing the influence of human actions on the food system [29]. While the definition of HFI continues to evolve, Khot et al.'s review outlines its scope across four key food phases: growing, cooking, eating, and disposing. This includes digital tools for agriculture, cooking techniques, technologies for eating experiences, and waste management. Researchers in HFI address diverse topics, including food production, logistics, consumption, augmented practices, speculative designs, and traditional food practices. A notable feature of HFI research is the use of workshops to gather diverse perspectives, which provide insights into challenges and potential solutions in the field [29].

Workshops such as "Crafting and Tasting Issues in Everyday Human-Food Interaction" and "Food and Interaction Design" focus on similar themes, including automation of human-food relationships, sustainability, tradition preservation, and the cultural significance of food. These workshops explore how food fosters social and personal well-being while offering transformative opportunities for critical engagement. Participants in these discussions raised concerns about technology's impact on traditions, highlighting food's role as a medium for creating and preserving cultural and ethical practices, as well as addressing global and local sustainability challenges [12, 13, 16].

The transformative potential of technology within HFI has been explored across various dimensions. Grimes and Harper introduced the concept of "celebratory technology," which emphasizes positive interactions with technology, focusing on themes of creativity, pleasure, and familial connections [17, 25]. This perspective complements debates on tensions between digital technology and the materiality of food, human agency versus technological efficiency, and the risk of innovation exacerbating inequality [17]. Broader themes in the future of HFI include personalization, sustainability, and social connectivity, highlighting the potential of technology to reshape traditional food practices [43].

Several studies emphasize preserving culinary heritage and fostering family connections. Research on digitalized homemade cookbooks illustrates their cultural value, allowing users to collect and personalize recipes, adding a unique personal touch to digital platforms [14]. Similarly, the Living Cookbook project demonstrates how multimedia cooking instructions can support domestic cooking while safeguarding culinary traditions [41]. In HCI, cultural heritage is pivotal for preserving traditions, enhancing user experience, and promoting sustainability within food practices [35].

Technological advancements in domestic food practices also emphasize balancing tradition with innovation. For instance, studies on nutrition-aware smart kitchens promote healthy cooking aligned with traditional preparation methods while avoiding excessive reliance on technology [10]. Other research highlights the role of social interaction in shaping modern food practices. A study on digital food journaling revealed the significance of shared experiences, as participants recorded additional notes to capture social events with family and friends [40]. Playful food interactions further underscore the cultural and familial dimensions of shared meals, showcasing how hands-on activities foster creativity and cultural awareness [3].

These studies collectively demonstrate how HFI bridges the domains of technology, tradition, and social connection. They emphasize the importance of preserving culinary heritage while addressing contemporary challenges such as sustainability and digital efficiency. By leveraging technology thoughtfully, HFI continues to explore meaningful ways to enhance human-food interactions.

2.3 Value-Sensitive Design Perspectives

HFI focuses on the interaction between humans and food, comprehending subjects like food growing, cooking, eating and disposing in a wider realm [29]. The fundamental purpose is to create technologies that empower food experiences, promote healthy eating habits, consider ethics in the context of food and address societal and cultural influences related to food.

Value-sensitive design aims to influence the form of existence with technology. It positions individuals such as researchers, designers, engineers, policymakers, and other stakeholders and society to conduct thoughtful inquiries into technological advancements, emphasizing the well-being of both humans and the natural World [22].

Technology emerges from the creative imagination of humans, who envision alternatives and actively shape their environment using available materials to improve the conditions of both human and non-human life. Consequently, all technologies inherently mirror and impact human values to some extent. Due to this profound interconnection, we must consider values in the design process. Embracing values during the design process provides not only creative avenues for technical innovation but also opportunities to enhance the human condition [22].

Both Human-Food Interaction (HFI) and Value-Sensitive Design (VSD) explore different aspects of technology. HFI investigates how interactive technologies shape individuals' relationships with food [29], while VSD offers a framework to ensure technology design aligns with societal human values [22]. By integrating VSD principles into HFI technology development, designers can address ethical considerations, cultural sensitivities, and potential societal impacts of food-related technologies.

Research highlights the pivotal role of food knowledge and culinary skills in shaping the dietary habits of young adults [30]. Challenges stemming from inadequate knowledge and misinformation contribute to confusion and erroneous dietary decisions among this demographic [27]. Besides, insights gleaned from workshops on Human-Food Interaction (HFI) designs elucidate debates encompassing concerns about the neglect of traditional food experiences [19]. Given the impact of factors such as home cooking on the dietary choices of young adults [30], avenues to leverage technology to reintroduce the young population with the traditional culinary practices are yet to be explored. Notably, while there is a dearth of research specifically targeting young adults that examines the intersection between HFI and Value-Sensitive Design (VSD), both fields share a common ethos of human-centric design. This shared commitment underscores a symbiotic relationship between HFI and VSD, as both emphasize the importance of incorporating human values into the development of technologies to yield positive impacts on individuals and society as a whole. Thus, the convergence of HFI and VSD lies in their shared objective of integrating human values into the technological innovation process. Additionally, Early adulthood, marked by the transition to independent living, often sees changes in food practices. As young adults frequently use digital devices, interventions utilizing technology could enhance relation with food [28]. Thus, this study aims to expand the knowledge with respect to understanding young adults' food practices from a value-sensitive design perspective by investigating their technology use while concurrently upholding traditional culinary habits.

3 Methods

This study comprised three steps: initial surveys and in-depth interviews with young adults, followed by a workshop with experts. Below, we detail the participant recruitment, data collection, and data analysis procedures for each phase. In-depth interview participants are denoted by the letter "P," while participants in the workshops are represented by "EP," indicating Expert Participants.

3.1 Data Collection

3.1.1 Survey and Interview with Young Adults. To gain comprehensive insights, we first surveyed young adults born between 1999 and 2004. We conducted an online survey using Google Forms, distributed through convenience and snowball sampling via WhatsApp and Messenger. The survey consisted of 13 questions (including two open-ended questions), divided into three primary sections: Demographic Information, Cooking Habits and Food Culture, and Opinions on Technology and Food Culture (see supplementary materials for survey and interview questions). The Demographic Information section included questions about the respondent's birth year, gender, and living situation. The Cooking Habits and Food Culture section examined how frequently respondents cooked, their perceptions of the relationship between family food culture and geography, the extent to which they incorporated their family's food culture into their personal lives, the values they deemed important in the food experience, and their sources of information for cooking. The Opinions on Technology and Food Culture section explored respondents' perspectives on the impact of technology on food practices. Lastly, respondents were asked to provide their email addresses to facilitate follow-up for in-depth interviews. 100 participants (65 female, 33 male, 2 unspecified) responded the survey within the research time-frame. It was also observed that the percentage distribution of responses stabilized and reached a saturation, showing minimal variation in the extracted responses.

To gain in-depth insights, we conducted interviews with participants from survey respondents who shared their contact information to further provide detailed views. The responses of these participants were selected among those who met the criteria of cooking at least three times per week and having either lived independently for a defined period or currently living independently were included in the interview process. The interviews focused on family food culture, personal habits, and future aspirations, aiming to uncover detailed perspectives on participants' food practices (see supplementary materials for survey and interview questions), and adding qualitative depth to the research. We interviewed ten participants (6 female, 4 male) in total (P1, P2...P10).

The in-depth interview included 13 questions focusing on three areas: Familial Experience, Personal Experience, and Technology and Future Projections. Familial Experience explored respondents' family food traditions, how these were integrated into their lives, and the similarities or differences from their family practices. Personal Experience examined resources used while cooking, sensory influences, and key aspects of respondents' relationships with food.

Technology and Future Projections investigated the role of technology in food-related activities, its perceived impact, and views on emerging technologies like AI, VR, and robotics. Additionally, it addressed intentions to preserve family traditions, preferred methods for storing food-related information, and expectations for future food experiences.

3.1.2 Workshops with Experts. To discuss the insights gathered from young adults we conducted two workshops:

1st Workshop with Designers: The first workshop one was about testing a card-based design tool that we created and developed to translate the knowledge gathered from the young adults accessible to experts. Thus, we recruited only designers (EP1, EP2, EP3, EP4 and EP5) in the first workshop to test and develop the tentative version of the cards. Five participants (three female, two male) designers participated in the workshop. Notably, one of the designers had experience collaborating with gastronomy students, which was helpful for incorporating interdisciplinary perspectives. The primary aim of the workshop was to test the categorization of the insights gathered from young adults based on the Schwartz's value inventory [39] and incorporating Value Sensitive Design [20, 22, 37] approach implemented in the card-based design tool.

A total of 31 cards were developed: 26 value cards, divided into 13 core values, 13 new values, and 5 value conflict cards. Each card featured front and back content, including 70 utterances collected from young adults [5]. The cards were designed to facilitate discussions about values and to identify potential design solutions related to food practices and cultural issues. These value cards were categorized into four groups: desired values, ideally supported values, values at stake, and value conflicts [6]. During the first workshop, participants worked in small groups, using the cards to explore and classify these values. The goal was to identify potential patterns and connections between values, direct/indirect stakeholders, and areas where conflicts between values might arise. This workshop also served as an opportunity to gather feedback on the tentative card set, assessing their usability and effectiveness in engaging experts with the data.

2nd Workshop with Interdisciplinary Teams: The second workshop aimed to discuss the insights gathered from the young adults and develop potential design solutions about their concerns in food practices with experts from different backgrounds. The workshop participants were recruited from the gastronomy and design departments via personal invitations and an open call to the mailing lists of the departments in the university. Nine experts (two research assistants in the gastronomy department who are doing their PhD, two chefs who are doing their master's degree, two PhD students in industrial design, two research assistants, two master's students, one communication design graduate, and one assistant professor from a communication design department) involved in the workshop. The participants were selected for their expertise and academic involvement, ensuring a rich exchange of perspectives between the fields of design (EP1, EP8, EP9, EP10, EP11) and gastronomy (EP6, EP7, EP12 and EP13). The timing and location of the workshops were determined in consultation with the participants. All workshops were conducted face-to-face on the university campus.

In the interdisciplinary workshop, the card set was utilized to make the insights readily accessible to the experts to be able to explore and ideate on the main topics about young adults' food interactions from a value-sensitive perspective. The core value list was expanded to 38 values, and the descriptions of the values were clarified. The post-pilot deck included 38 one-sided value cards, updated and clarified based on the feedback, and 70 utterance cards that represented specific statements or insights from the interviews with young adults. These utterances were organized to reflect themes and refined in the first workshop.

In the interdisciplinary workshop, participants worked in dyads (one designer and one gastronomist, or in some cases, two designers and one gastronomist). They were given the flexibility to classify the utterances and categorize the values using stickers to represent each value type [6] (Figure 1a). The card deck included the value-type stickers and refined content to facilitate the classification process. Participants used the cards to cluster related values by grouping similar values together and identifying connections based on thematic relevance using the value cards (Figure 1b). They also established relationships by examining how different values interacted, where conflicts occurred, and where they overlapped using the utterance deck.

Using stickers, participants classified the values into four groups: desired, ideally supported, values at stake, and value conflicts [6] (Figure 1a). This session allowed the participants to explore food-related values and their implications in depth. The task was not only to engage with the research data but also to generate ideas that could inform potential design solutions to improve food practices among young adults. After using the cards, the workshop concluded with an evaluation session focusing on two main tasks. Participants spent significant time brainstorming and ideating based on the values and problem definitions established in the first session. In the final task, they evaluated their ideas using the "Dynamic Underpinnings of the Universal Value Structure" [39] on a card board (Figure 3). This board enabled a reflective evaluation of how well their ideas aligned with and addressed the identified problem within the established value framework.

All participants resided in major metropolitan areas of Southeastern Europe, where social life and traditions are influenced by multicultural environments. Survey and interview participants were students or recent graduates, while workshop experts included chefs, managers, and academics in gastronomy, as well as graduate students, academics, and designers in the field of design. The project received ethical approval from the university, and all participants provided written consent.

3.2 Data Analysis

The survey data were primarily analyzed through descriptive statistics, starting with a review of basic demographic information. The responses to the structured survey questions were analyzed to identify trends and patterns in young adults' food habits, family food culture, and their attitudes toward technology's role in food-related activities. After collecting responses, the percentage distribution of answers was examined, revealing that the responses began to stabilize after a certain number of participants, indicating

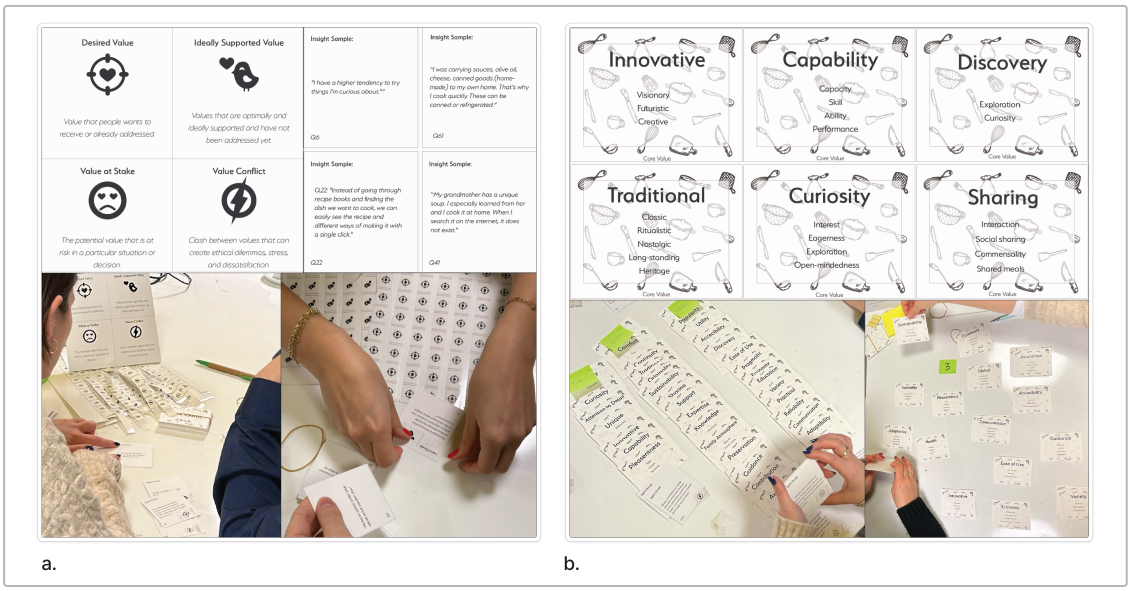


Figure 1: a. Icons of Provided Stickers as Value Types and Samples of Utterances(70), b.Samples of Value Cards (38) .

saturation in the variety of responses. These findings were then used to inform the questions for the in-depth interviews.

The interview data were analyzed using a reflexive thematic analysis approach [9, 11]. The analysis process followed several steps: First, all interviews were transcribed and translated to ensure consistency and clarity. An interpretative and latent analysis approach was employed, with a constructionist epistemological perspective, to understand both latent and observable content in the participants' responses [42]. Following this, the research team reviewed and refined the themes to ensure they accurately reflected the data and aligned with the research objectives. In total, 300 utterances from the interview transcripts were analyzed and categorized according to a value inventory [37] into 38 value clusters by using affinity diagram, which were then refined into themes using a reflexive thematic analysis approach. In the thematic analysis, an external researcher systematically organized the transcribed data into themes, with 70 of the most representative utterances selected to illustrate the themes that emerged during the analysis process.

An initial review of the transcripts was conducted to capture preliminary ideas or insights, after which the data were coded into smaller segments based on key ideas and concepts. Data-driven categories were applied to the coded segments, such as "Technology's Clear Visual Roadmap," "Curiosity about Global Cuisines," and "Discovery and Creativity," to organize the data into meaningful patterns. This coding process was iterative, repeated three times across all ten interview transcripts to ensure consistency and category saturation, meaning that further analysis would yield minimal new insights. To ensure reliability, an external researcher was involved in the final round of coding. The individual categories were then grouped into broader themes that reflected critical aspects of the data, such as the preservation of culinary heritage, fostering relationships, and the globalized nature of food.

The workshops helped to validate the mapping of the sample utterances in relation to value types and refine the information provided in card-based design tool. The workshop also helped to generate and discuss new ideas for potential design solutions based on the values and practices identified in earlier phases of the study. In both workshops, participants reflected on the interview data and used the cards to explore and categorize values relevant to food practices. The analysis focused on identifying key patterns in how participants classified and connected these values. Feedback from both workshops revealed important aspects of food culture, values at stake, and potential conflicts in how values are perceived by different groups. Participants in the workshops evaluated their own processes and data. We subsequently transcribed their statements and presentations and synthesized the results using an affinity diagram. The analysis of the workshop discussions, combined with insights gathered from the cards, formed the foundation for developing actionable design solutions. This analysis also highlighted design challenges that would need to be addressed in future iterations of the project.

4 Findings

4.1 Insights Gathered from the Survey

Demographic data showed 31% of participants lived with siblings, 22% independently, 14% with roommates, 10% with parents, and 19% in dorms. Cooking habits revealed 35% cooked frequently (4-5 times weekly), and 27% occasionally (1-2 times weekly).

Geographical location influenced family food culture: 61% saw it as major, 36% somewhat influential, and 3% irrelevant. Most incorporated family traditions (52% often, 31% occasionally). Opinions on preserving food habits varied: 26% valued it highly, 26% were neutral, 16% found it unimportant, and 6% negligible. Internet/social

media were primary culinary sources for 64%, with 25% relying on maternal figures.

Taste was paramount for 89%, followed by health (42%) and practicality (39%). Future eating habits were anticipated to vary while preserving cultural elements (58%), with some preferring current practices (23%) or expecting technological changes (9%). Technology's impact was seen as minimal (44%), potentially convenient (37%), or negative (16%).

This dataset pointed out the preeminence of taste and highlighted diverse expectations concerning the evolution of food-related family habits and the role of technology in culinary experiences.

4.2 In-depth Insights from the Interviews

The thematic analysis [11] of young adults' food practices from a value-laden perspective yielded recurring themes derived form the in-depth insights. The analysis revealed five overarching themes, each comprising several sub-themes which we describe in detail below (also see figure 2).

4.2.1 Preservation of Culinary Heritage and Fostering Relationships: The theme of Preservation of Culinary Heritage and Fostering Relationships emerged prominently in our study, reflecting participants' perspectives on maintaining traditional culinary practices, the influence of familial cooking traditions, and the significance of communal meals in nurturing social bonds. This overarching theme is further explored through the following sub-themes:

Passing Down Traditions to Future Generations and Eroding Culinary Heritage: Participants expressed concerns about the preservation of culinary heritage, underscoring the importance of safeguarding traditional dishes and practices for future generations. One participant emphasized the vulnerability of traditional cuisine, particularly due to the younger generation's limited engagement, especially within digital contexts. *P7: "Given that the young population exhibits limited affinity for traditional dishes, which are consequently underrepresented on digital platforms, there exists a risk of these culinary traditions fading into oblivion."* Furthermore, it was acknowledged that food culture is inherently dynamic and evolves in response to societal transformations, as articulated by another participant: *P10: "As societal affluence increases, there is a likelihood of food culture transforming, potentially diverging from established traditions."* Participants emphasized preserving culinary heritage while recognizing food culture's dynamic nature, highlighting the need to balance tradition with adaptation in modern contexts, particularly through digital engagement.

Familial Culinary Traditions on Personal Choices: Familial culinary traditions emerged as an important influence on participants' cooking preferences and methods. Many participants reported adopting their mothers' cooking styles, often without conscious intent: *P5: "I unwittingly replicate my mother's cooking techniques, having developed an affinity for her culinary style, a realization that was rather surprising."* Instances of mutual adaptation within families were also highlighted. One participant described how their mother adjusted traditional recipes to incorporate healthier options based on family feedback: *P4: "For example, my mother puts a lot of butter in food. I find it unhealthy, and now she has learned from me to make it with less butter or with olive oil. In other words, we learn from each other."* Familial culinary traditions shape personal cooking choices, with participants often inheriting techniques unconsciously while influencing and adapting family practices to reflect contemporary preferences.

Preserving Specific Aspects of Culinary Traditions: Participants highlighted the necessity of safeguarding distinct elements of culinary traditions, such as unique cooking techniques and cherished family recipes. The value of intergenerational culinary knowledge was highlighted, with one participant sharing a personal family tip: *P4: "My grandmother says to squeeze lemon and add a cube of sugar when making rice; the internet and technology do not tell me this. Such things harm the preservation of the culture."* The diversity inherent in traditional recipes and the practice of preserving homemade foods for convenience were also appreciated. One participant described their reliance on family-prepared ingredients to facilitate meal preparation: *P6, P7: "I carry sarma, tomato sauces, olive oil, cheese, and canned food (homemade) to my home from my parents' home. So, I make meals quickly in my personal life. These foods are canned or in the freezer in my home for long-term use."* Participants emphasized preserving unique culinary techniques, family recipes, and intergenerational knowledge while valuing the convenience of traditional homemade ingredients, which support both cultural continuity and modern lifestyles.

Nurturing Relationships: Participants identified communal meals as integral to fostering interpersonal relationships and strengthening social bonds. The shared experience of dining and cooking was highly valued, even when family members were not physically present. However, some participants expressed concerns about the potential decline of these traditions over time: *P9: "I think food is a unifying factor; it means getting together in the evenings even if everyone is working. After 20 years, this unifying effect may decrease…"* The communal nature of food preparation was further emphasized through the joy derived from cooking with friends. One participant reflected on the meaningfulness of shared cooking experiences, regardless of the culinary outcome: *P5: "Even if the outcome is a bad meal, the enjoyment and memorable experiences from the cooking process, especially when shared with friends, are always more meaningful and rewarding."* Participants highlighted communal meals and shared cooking for nurturing relationships, valuing these traditions despite concerns about their potential decline over time.

The preservation of culinary heritage and the nurturing of relationships through communal meals emerged as one of the central themes in participants' narratives. Participants expressed a strong commitment to transmitting culinary traditions across generations, adapting family practices to align with personal preferences, and safeguarding unique aspects of culinary heritage. Additionally, shared meals were recognized as a powerful medium for strengthening interpersonal connections and fostering communal bonds. These insights indicate the potential for culinary practices to serve as milestones in developing sentimental attachments and upholding traditional values, even as technological advancements enable new forms of interaction across distances.

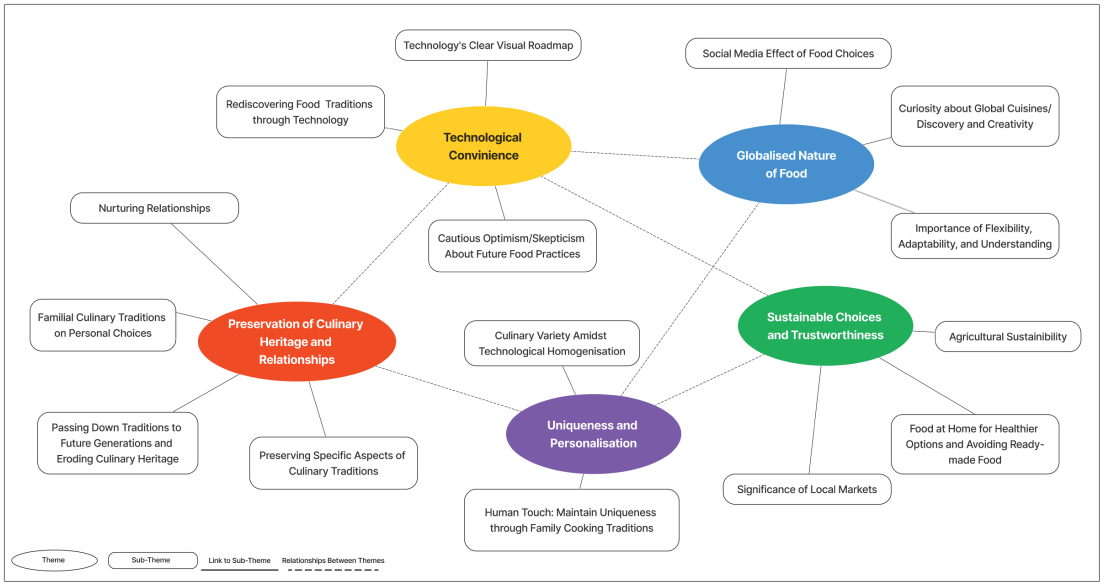


Figure 2: Thematic Map Demonstration 5 Themes

4.2.2 Technological Convenience: The theme of Technological Convenience illuminated participants' perspectives on the transformative effects of technology on food practices. This theme encompassed discussions about how technology supports the revival of traditional food practices and its potential for driving future innovations in food preparation and consumption. Participants expressed a sense of cautious optimism about these advancements. The three sub-themes related to this topic are detailed below:

Rediscovering Food and Traditions Through Technology: Participants acknowledged the essential role of technology in rekindling interest in culinary practices and facilitating the rediscovery of traditional food knowledge. One participant emphasized the transformative impact of technology in making previously inaccessible culinary knowledge more widely available: *P8: "Previously inaccessible traditional food knowledge is now being rediscovered and disseminated through technology."* Technology was viewed as a bridge between generations and an important tool for preserving cultural culinary legacies. The enhanced accessibility to diverse recipes and cooking knowledge resulting from technological advancements was recognized, with one participant noting: *P10: "With the development of technology, there has been a notable surge in people's interest and knowledge in cooking."* Participants also highlighted the value of utilizing multimedia to archive recipes and document cultural food activities to ensure their long-term preservation: *P7, P8: "Audio recordings and video footage documenting recipes and cultural food activities may be archived to ensure the preservation of the culinary environment."* Participants recognized technology as a powerful tool for rediscovering and preserving traditional culinary knowledge, bridging generations, and enhancing access to diverse recipes. Multimedia archiving was highlighted as a key strategy for safeguarding cultural food practices for future generations.

Technology's Clear Visual Road-map: Participants highly valued technology's visual clarity and accessibility in the realm of culinary exploration. They found detailed visual guides on online platforms particularly beneficial for enhancing their cooking skills. One participant shared their experience: *P4: "I follow a website curated by housewives, which offers step-by-step visual guides, mirroring real home settings; it's quite insightful."* The convenience of digital archives was frequently preferred over traditional notebooks due to its accessibility and user-friendliness. One participant remarked on this advantage: *P6: "Digital recipe archives offer unparalleled accessibility and ease of use compared to traditional notebooks; I prefer using Instagram to archive recipes…"* Participants appreciated technology's visual clarity and accessibility in culinary exploration, particularly valuing step-by-step visual guides and digital recipe archives for their convenience and user-friendliness.

Cautious Optimism/Skepticism About Future Food Practices: Participants recognized the potential of technology to enhance culinary experiences but expressed caution regarding the future direction of food practices increasingly dominated by technological advancements. Concerns were raised about the potential loss of the intrinsic value and enjoyment associated with cooking in an era characterized by excessive convenience: *P5: "Over-reliance on technology and overly simplified dining experiences could detract from the essence of culinary enjoyment."* There were also reservations about the increasing automation of kitchen tasks, with a clear preference for maintaining human oversight. However, participants acknowledged the potential benefits of integrating IoT products for convenience: *P3: "Integration of IoT products in the kitchen for enhanced convenience is a plausible future development, albeit with reservations."* Participants expressed cautious optimism about technology's role in future food practices, valuing its potential benefits while voicing

concerns about over-reliance on automation. Maintaining a balance between technological convenience and human control was emphasized.

The theme of Technological Convenience reflected participants' nuanced perspectives on the impact of technology on culinary practices. While participants appreciated technology for enabling culinary exploration, preserving traditions, and providing visual guidance, they also raised concerns about the potential for excessive reliance on technology to undermine the authentic human experience of cooking. Nevertheless, technology presents numerous opportunities across all themes, facilitating advancements and enriching the culinary landscape among young adults in this study.

4.2.3 Globalised Nature of Food: The theme of Globalised Nature of Food prominently emerged in our study, capturing participants' perspectives on the accessibility of global cuisines, the importance of flexibility in food choices, and the influence of social media on culinary preferences. The sub-themes associated with this topic are explained in detail below:

Curiosity about Global Cuisines/Discovery and Creativity: Participants demonstrated a strong curiosity about global cuisines, a trend facilitated by globalization and the accessibility of digital platforms. This curiosity often led participants to express a willingness to experiment with new foods, driven by a desire for discovery and creativity. One participant highlighted this expanded access: *P8: "Globalization has made it easier to access not only the food of one's own culture but also the food of other countries, enabling exploration of diverse tastes."* Social media and television were identified as important catalysts for culinary curiosity, sparking interest in foods from various cultural backgrounds: *P7, P9: "When I encounter diverse culinary content on social media or television, it sparks my curiosity about different cultures' foods."* Participants showed curiosity about global cuisines thanks to the digital platforms. Social media and television were key in inspiring interest and experimentation with diverse foods.

Importance of Flexibility, Adaptability, and Understanding: Flexibility and adaptability were deemed essential for navigating the complexities of the globalized food landscape. Participants acknowledged the dynamic nature of food culture and emphasized the importance of adapting to societal changes to remain responsive to these shifts: *P10: "Food culture is evolving with increasing affluence."* Participants also pointed out the challenges involved in accommodating diverse dietary preferences, highlighting the need for understanding and consideration when preparing meals for others: *P2: "My friends' dietary preferences differ from mine, which poses challenges when preparing meals they might enjoy."* Participants emphasized the importance of flexibility and adaptability in navigating the evolving global food landscape, recognizing the need to respond to societal changes.

Social Media Effect on Food Practices: Social media platforms were identified as important influences on food choices and food practices. Participants shared that they frequently used social media to discover healthy recipes and meal ideas: *P1: "I actively search for and save healthy recipes and meal ideas on TikTok to incorporate into my diet."* The repeated appearance of certain recipes on social media motivated participants to experiment with new dishes, with many indicating that consistent exposure increased their likelihood of trying new recipes. Additionally, participants recognized the potential of social media as a modern repository for preserving family recipes: *P5: "Social media could serve as a contemporary recipe book for the next generation."* Participants highlighted social media's role in influencing food choices, discovering recipes, and encouraging experimentation. It was also seen as a potential tool for preserving family recipes for future generations.

The theme of Globalised Nature of Food was a central element in participants' narratives, emphasizing increased accessibility to and curiosity about global cuisines, the importance of flexibility and understanding in food choices, and the notable influence of social media on food practices. Participants demonstrated a willingness to explore diverse culinary experiences while navigating the complexities and opportunities inherent in a globalized food environment. This theme has the potential to share numerous values with the theme of Technological Convenience, suggesting potential areas for synergy and collaboration between all themes, creating opportunities for further exploration and integration.

4.2.4 Uniqueness and Personalisation: The theme of Uniqueness and Personalisation emerged prominently in our study, reflecting participants' perspectives on preserving distinct culinary traditions and the challenges that technology poses to maintaining culinary individuality. The sub-themes related to this theme are detailed below:

Human Touch/Maintain Uniqueness Through Family Cooking Traditions: Participants emphasized the irreplaceable value of the human touch in maintaining culinary uniqueness, particularly through family cooking traditions. They acknowledged a generational shift in cooking practices but indicated a strong commitment to preserving essential elements of family traditions. Despite the advancements in technology, there was notable skepticism regarding its ability to replicate the nuanced flavors and personal touches inherent in family recipes. One participant highlighted this sentiment: *P6: "While it may be possible to program a robot to replicate certain recipes in the future, capturing the distinctiveness and subtle nuances of my mother's cooking remains unattainable."* Another participant expressed a clear preference for familial culinary experiences over those mediated by technology, stating: *P7: "Given a choice between a meal prepared by my mother and an identical one from a robot, I would invariably opt for my mother's rendition due to its sentimental value and unique touch."* Participants valued the human touch in family cooking traditions and doubted technology's ability to replicate the unique flavors and sentimental value of homemade meals, emphasizing the importance of preserving these traditions.

Culinary Individuality Amidst Technological Homogenization: Participants raised concerns about the potential for technology to homogenize culinary experiences. While acknowledging the efficiency and convenience that technology offers, participants felt that it often standardizes recipes, thereby diminishing the individuality and distinctive techniques associated with traditional cooking. One participant noted: *P4: "Technology tends to standardize culinary recipes, undermining the individuality and unique methods associated with traditional cooking practices."* There was also a clear desire among participants for culinary creations that reflect personal or familial approaches, as opposed to conforming to technological trends. One

participant mentioned a soup recipe specifically that her grandmother cooks: *P1: "I aspire for culinary creations that embody my unique approach or my grandmother's recorded methods, resisting the homogenizing influence of technology."* Participants expressed concerns that technology could standardize recipes, reducing the individuality and unique techniques of traditional cooking. While recognizing technology's convenience, they valued personal and familial approaches to cooking that resist homogenization.

The Uniqueness and Personalisation theme underscored participants' commitment to preserving the distinctiveness of family cooking traditions and highlighted the challenges that technology poses to maintaining culinary individuality. Participants expressed a strong preference for human touch and familial practices over standardized technological solutions, emphasizing the importance of safeguarding unique culinary legacies amid technological advancements. This theme highlights emerging conflicts but also points to potential pathways for resolution. By integrating technological features such as customizability, responsiveness, and flexibility, there may be opportunities for further development that support both the preservation of personal culinary traditions and the benefits of modern technology.

4.2.5 Sustainable Choices and Trustworthiness: The theme of Sustainable Choices and Trustworthiness emerged as an important aspect of our study, highlighting participants' perspectives on the importance of local markets, the preference for homemade food, and the broader concept of agricultural sustainability. The sub-themes associated with this theme are detailed below:

Significance of Local Markets: Participants expressed notable trust in local markets as their preferred food source, often choosing them over supermarkets due to concerns regarding product quality. This preference highlights participants' desire for fresh, locally sourced produce and highlight their trust in the quality and authenticity that local markets provide. One participant shared: *P3: "I harbor reservations about supermarkets when it comes to vegetables and fruits, perceiving them as lacking in organic quality."* Another participant recounted a personal experience of seeking out local markets for family-specific foods that were not available in mainstream stores: *P2: "We frequented the local market for a particular meal that is quite popular in our family during the summers…"* Participants preferred local markets over supermarkets for their trust in the quality and authenticity of fresh, locally sourced produce. This preference reflects a desire for high-quality ingredients and unique foods.

Food at Home for Healthier Options and Avoiding Ready-made Food: Participants emphasized the value of homemade food for its health benefits and nutritional integrity. One participant noted a preference for home-prepared meals, even when frying, due to the belief that it is healthier when done at home: *P3: "I opt for homemade food for its health benefits. While frying is generally considered detrimental to health, it remains a healthier option when prepared at home."* Another participant shared their avoidance of ready-made meals, citing concerns over their nutritional adequacy: *P7: "I abstain from purchasing ready-cooked meals, consistently opting for natural foods due to my reservations about the nutritional adequacy of ready-made options."* Participants valued homemade food for its health benefits and nutritional integrity, preferring it over ready-made meals due to concerns about their health and nutritional quality.

Agricultural Sustainability: Participants highlighted the sustainability associated with local delicacies, noting their minimal resource use and contribution to waste reduction. One respondent emphasized this point: *P10: "Certain local delicacies hold intrinsic value in terms of sustainability, owing to their minimal resource consumption and waste production during times of scarcity."* Concerns were also raised regarding the decline of local dishes and its potential negative impact on sustainable agricultural practices: *P1: "Not all crops thrive uniformly across the same soils; gastronomy and agriculture share an intimate bond, and the waning popularity of local dishes poses a threat to sustainable agricultural practices."* Additionally, participants expressed apprehensions about the potential effects of advanced technology on both taste and soil composition: *P2: "Artificial intelligence has minimal effects. Other than that, there is taste, it will definitely not be the same taste; the product and the soil change."* Participants valued the sustainability of local delicacies for their minimal resource use and waste reduction. They expressed concerns about the decline of local dishes affecting sustainable agriculture and the potential impact of technology on taste and soil quality.

Sustainable Choices and Trustworthiness are pivotal factors influencing food practices, encompassing agricultural sustainability, the health advantages of homemade food, and the essential role of local markets in maintaining quality and authenticity. Food systems are integral to achieving sustainable development, impacting 12 of the 17 United Nations Sustainable Development Goals [4]. Emphasizing sustainable practices and integrating technology could strengthen food production and shopping practices, fostering a more resilient and eco-friendly food system.

The thematic map resulting from the thematic analysis illustrates the interconnectedness of themes through subthemes (Figure 2), a connection identified by researchers and reinforced during workshops with experts. Food practices and experiences cannot be fully isolated from one another; these insights collectively inform the identified design challenges and potential implications. Addressing a specific theme and its associated design problem can be supported by insights from related and different themes. Thus, while themes may be evaluated individually, their interdependence remains important. Technology serves as the underlying thread or focal point across all themes, whether its influence is perceived as positive or negative.

4.3 Outcomes of Workshop with Experts

The workshop with experts aimed to clarify young adults' perspectives and priority values regarding food practices, ultimately generating design solutions informed by these insights. The participants were divided into four interdisciplinary teams, each comprising designers and experts in gastronomy. This composition ensured a blend of perspectives, balancing technical expertise with cultural and culinary understanding. After the sessions, each team evaluated their proposed ideas using Schwartz's framework of values [39] to position their solutions within the broader context of conservation and openness to change.

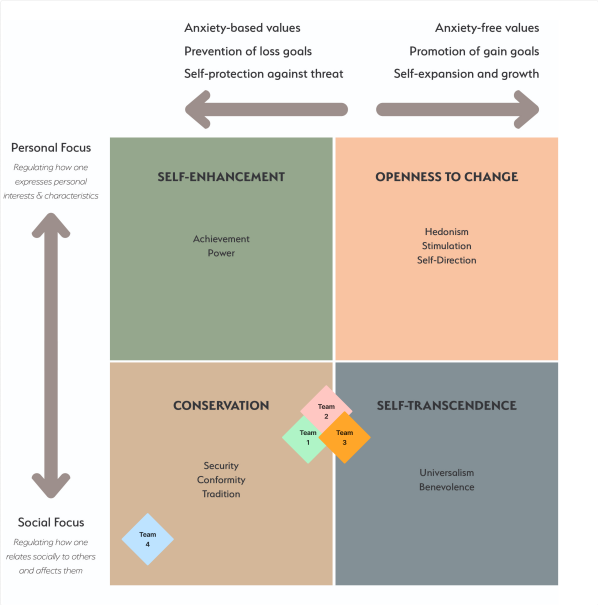


Figure 3: The evaluation of the teams in the workshop based on the "Dynamic Underpinnings of the Universal Value Structure" [39].

Team 1 (EP11 and EP12): This team analyzed values through three overarching categories: Local, Global, and Exclusive. Local values included knowledge, sharing, family, sustainability, and traditions. Global values, relevant to Gen-Z, encompassed ease of use, practicality, pragmatism, and popularity. Exclusive values highlighted creativity, innovation, and curiosity. Despite identifying "sharing" as the most important value, the team acknowledged its dual nature, proposing mechanisms to mitigate oversharing and reduce information pollution. For example, ethical control measures were suggested to protect personal space and ensure accurate information transmission. They also noted a disparity in awareness between lesser-known local items (e.g., Cemele Pepper) and globally recognized ones (e.g., Wasabi). Their proposals aligned with the Conservation area on Schwartz's framework (Figure 3), reflecting a focus on "Self-Transcendence" values while emphasizing ethical sharing practices.

Team 2 (EP9 and EP13): This team categorized values into five groups: Knowledge, Family Values, Traditional Values, McDonaldization, and Communication Design. Initially emphasizing family relationships and sharing, the team ultimately focused on traditional values. Their proposed solution was an AI-supported bot that functions as a dynamic blog to preserve culinary traditions. This bot would highlight ingredients, authenticity, and users' ability to personalize and reinterpret recipes, fostering culinary innovation while safeguarding tradition. Positioned in the Conservation area, their proposal aligned with preserving traditional values while addressing the tension between innovation and cultural preservation, steering away from openness to change and self-enhancement values (Figure 3).

Team 3 (EP1, EP6 and EP10): Team 3 categorized values into two broad areas: Culture and Technology. Cultural values included global aspects like communication and popularity, as well as local aspects such as preservation and tradition. Technological values, on the other hand, focused on ease of use and discovery. Recognizing the dual role of technology, the team chose to prioritize cultural aspects. They proposed a social-media-integrated app designed to foster intercultural interaction, promote culinary diversity, and transmit traditional values and tastes across generations. AI would enable users to capture and process images of traditional cooking techniques, supporting the preservation of these practices. This solution addressed the challenge of bridging generational gaps and interpreting values variably across demographics. Their app was positioned in the Conservation area (Figure 3), balancing cultural preservation with technological innovation and emphasizing a social, community-oriented approach.

Team 4 (EP7 and EP9): This team worked on five main themes: tradition, discovery, sustainability, ease of use, and relationships. They explored ways to preserve traditional practices amidst modern technological trends and ensure their transmission to younger generations. Their solution, an app named Ask My Grandmother, offered an accessible platform for sharing unique recipes and safeguarding regional culinary traditions. With features such as short, TikTok-like videos and a focus on local ingredients, the app emphasized authenticity. The team also advocated for promoting heirloom seeds to sustain flavor and authenticity, contrasting these efforts with concerns about Napoli tomatoes produced outside their traditional regions. Additionally, they proposed integrating recipes into state systems and genealogy through a concept called e-seed to deepen preservation efforts. Their proposal was positioned in the Conservation area (Figure 3), underlining a focus on protecting cultural heritage through a social and intergenerational lens.

Although values related to conservation—such as tradition, conformity, and security—have declined among Millennials in the country where our study was conducted, and both self-transcendence (harmony) and conservation (collectivism) values have also diminished over time [33], the workshop teams universally prioritize the preservation of traditional values and practices. They view this preservation as crucial for maintaining cultural heritage and integrating technology to aid in their transmission across generations.

The teams collectively recognize the importance of cultural values and traditions, emphasizing their role in fostering continuity. Their proposals reflect a commitment to:

Sustainability: Highlighting the need to preserve traditional practices and utilize local resources responsibly. Community and Interpersonal Relationships: Stressing the significance of these elements in preserving and transmitting cultural values. Innovation and Adaptation: Ensuring that traditional practices remain relevant in modern contexts while embracing technological advancements. Overall, the workshop findings underscore a strong commitment to preserving cultural heritage, adapting traditional practices to contemporary settings, and leveraging technology to enhance the continuity and relevance of these practices.

As shown in Table 1 the teams' compositions, focus areas, and proposed solutions alongside their positioning on Schwartz's framework. This structured approach not only clarifies the contributions

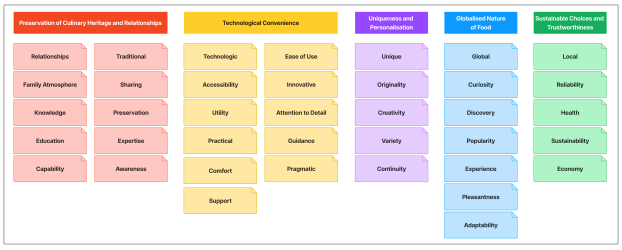


Figure 4: Value List to Adapt Food Practices of Young Generation

of each team but also situates their proposals within the larger value-based framework of the study. The workshop findings demonstrate a collective emphasis on preserving cultural heritage, fostering community relationships, and leveraging technology to bridge generational gaps and sustain culinary traditions.

5 Discussion

This research examines the intersection of technology and tradition in young adults' food practices through a value-sensitive design (VSD) approach. Data collected through surveys and in-depth interviews were analyzed using reflexive thematic analysis and evaluated through an iterative workshop process. This led to the identification and categorization of 38 key values into five themes, as shown in Figure 4. These themes, informed by young adult insights, interact dynamically, creating various value conflicts, which are reflected in the generative card-based design tools developed during the study.

To further explore these interactions, the identified themes were analyzed using Schwartz's "Dynamic Underpinnings of the Universal Value Structure" diagram (Figure 5). This theoretical framework, based on Schwartz's theory of Basic Values, emphasizes universal values that evolve over time and across cultural contexts to meet social and survival needs. The framework revealed four major value conflicts, underscoring the dynamic and sometimes competing nature of universal values in relation to contemporary food practices [1, 23, 39].

5.1 The Themes Placed on the Universal Human Values

The evaluation of themes in this study utilized Schwartz's "Dynamic Underpinnings of the Universal Value Structure" diagram to analyze the interplay and scope of values. Schwartz's theory identifies ten fundamental values recognized across cultures, each with distinct motivational drivers, and highlights common conflicts, such as those between openness to change versus conservation and self-transcendence versus self-enhancement [39]. This tool enabled a systematic assessment of themes, illustrating their alignment with fundamental values and revealing key conflicts. The diagram visually mapped these complex relationships, and our analysis identified five primary value conflicts.

The evaluation showed variability in how themes were placed within the diagram (Figure 5). Notably, during the expert workshop, all proposed solutions fell within the "Conservation" area,

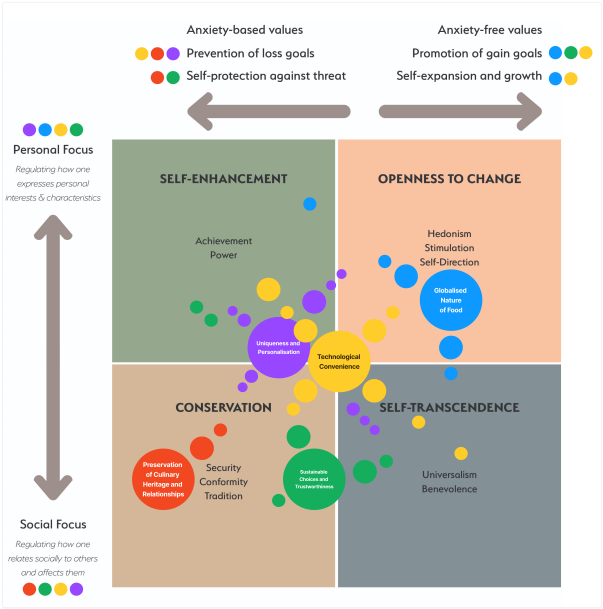


Figure 5: Placements of Themes "Dynamic Underpinnings of the Universal Value Structure" Diagram[39] Based on the Color Code of the Themes: *Red: Preservation of Culinary Heritage and Relationships, Yellow: Technological Convenience, Purple: Uniqueness and Personalisation, Blue: Globalised Nature of Food, Green: Sustainable Choices and Trustworthiness*

although experts demonstrated flexibility in their interpretations of the diagram.

The Dynamics of "Preservation of Culinary Heritage and Relationships":

The thematic category "Preservation of Culinary Heritage and Relationships" includes values such as relationships, tradition, family atmosphere, sharing, knowledge, preservation, education, expertise, capability, and awareness. Through interviews and workshops, participants expressed concerns about the potential loss of traditional food practices and emphasized the need to pass these traditions to future generations. They also highlighted the impact of rapid technological advancements and noted that familial food practices, while evolving, remain connected to tradition through special recipes and seasonal preparations. This theme points out the dual significance of food knowledge and the relationships formed around food, reflecting both individual and societal benefits. It predominantly represents "Conservation" values, focusing on tradition and family ties, but also shows alignment with "Openness to Change" through values like capability and education (Figure 5). Thus, this theme introduces a minor tension within food practices.

The Dynamics of Technological Convenience: The thematic domain of "Technological Convenience" includes values such as technology, ease of use, accessibility, innovation, utility, and comfort. Participants emphasized technology's role in enhancing practicality and convenience, particularly in streamlining personal routines and accessing detailed food-related information. This theme

Table 1: Summary of Teams and Design Proposals

Team	Categorized Values	Proposed Design Solution	Position on the Diagram
Team 1	Local: Knowledge, Sharing, Family, Sustainability, Traditions Global: Ease of Use, Practicality, Pragmatism, Popularity Exclusive: Creativity, Innovation, Curiosity	Proposed solutions to address oversharing and information pollution through control mechanisms. Recommendations for managing sharing practices to protect personal space and ensure accurate transmission. Highlighted disparity in awareness between local and global food items.	Conservation Self-Transcendence
Team 2	Knowledge, Family Values, Traditional Values, McDonaldization, Communication Design	AI-supported bot for culinary tradition preservation. Bot emphasizes authenticity and allows users to add recipe interpretations, harmonizing tradition with innovation.	Conservation
Team 3	Culture: Communication, Popularity, Preservation, Reliability, Tradition Technology: Ease of Use, Discovery	App integrating social media for intercultural interaction. Uses AI to process images of traditional cooking, enabling recording and sharing of cooking techniques. Focuses on fostering communication across generations and cultures.	Conservation
Team 4	Tradition, Discovery, Sustainability, Ease of Use, Relationships	App named "Ask My Grandmother" featuring TikTok-like videos for traditional recipes. Promotes heirloom seeds and integrates genealogy with a concept called "e-seed." Focuses on safeguarding cultural heritage.	Conservation

occupies a central position in the diagram due to its inherent conflicts (Figure 5). While participants acknowledge technology's potential benefits, they also express skepticism about its impact on food practices. They see technological convenience as a means to complement other thematic areas, suggesting that it can aid in preserving traditional values, improving social awareness through tech-enabled initiatives, and enriching food-related relationships by integrating new information and practices.

The Dynamics of "Uniqueness and Personalisation": The theme of "Uniqueness and Personalisation" highlights the value participants place on human touch and individuality in culinary practices, emphasizing the importance of family cooking traditions and resisting standardization. This theme, which includes values such as uniqueness, originality, creativity, variety, and continuity, reflects participants' desire for meals that are both diverse and tailored to personal preferences. While they appreciate culinary innovation, they also aim to preserve and recreate family recipes, illustrating a tension between embracing new culinary experiences and maintaining traditional practices. Participants are concerned that technological influences might alter their food practices compared to those of family members. This theme thus spans the domains of "conservation" and "self-enhancement," impacting other value clusters as well (Figure 5).

The Dynamics of "Globalised Nature of Food":

The theme "Globalised Nature of Food" captures values such as global awareness, curiosity, discovery, popularity, and adaptability. Young adults show a strong interest in exploring global culinary trends and emerging food cultures, driven by their engagement with social media and technological tools. They are eager to experiment with diverse cuisines and embrace trends from platforms like TikTok, reflecting an openness to change and a desire for new experiences. This theme highlights their proactive approach to integrating novel ideas and culinary practices without creating inherent internal conflicts (Figure 5).

The Dynamics of "Sustainable Choices and Trustworthiness":

The theme "Sustainable Choices and Trustworthiness" incorporates values such as local sourcing, reliability, health, sustainability, and economy. Primarily aligned with the "conservation" domain, it also reflects elements of "self-transcendence" through its emphasis on health and sustainable agriculture. Participants highlighted the importance of home cooking and local markets for their health benefits and sustainability, connecting these practices to broader ecological concerns. The theme, which focuses on preserving food practices and resources, shows clear alignment with "conservation" but also generates tension with the "openness to change" domain, particularly among young adults (Figure 5).

5.2 Value Conflicts

Drawing insights from participant data, five key value conflicts have emerged. First, there is a tension between technological convenience and cultural food practices, as participants weigh the practical benefits of technology against the potential erosion of cultural nuances. Second, a nuanced conflict exists between human

touch and innovation, with technological advancements impacting familial culinary traditions and relationships. Third, participants face a dilemma between sustainable choices and convenience, balancing the benefits of locally sourced food against the appeal of ready-made options. Fourth, a conflict arises between preserving culinary traditions and the influence of social media, highlighting the tension between health trends and established culinary norms. Finally, there is a clash between diversity and standardization, as participants seek personalized food experiences while expressing concern over technology's potential to homogenize recipes.

Conflicts Between Technological Convenience and Cultural Food Practices:

While technology offers serious convenience in food practices, it also poses a risk of overshadowing or replacing cultural nuances in cooking, creating a conflict between efficiency and the preservation of cultural heritage. Participants recognize technology's role in enhancing cooking knowledge and efficiency but express concern about its potential to erode cultural values and traditions. This tension manifests in fears that automated cooking tools and streamlined devices may undermine the social and artisanal aspects of home cooking, leading to a loss of cultural identity and craftsmanship. There is apprehension that cultural dishes may not be adequately represented online, risking further erosion of traditional practices. This conflict highlights the need for Human-Food Interaction (HFI) research to balance technological advancements with the preservation of traditional methods and local ingredients, acknowledging their historical and sociological significance [29]. Ultimately, participants navigate a delicate balance between embracing technological efficiency and maintaining cultural heritage, reflecting the ongoing challenge of integrating modern innovations while safeguarding traditional culinary practices.

Conflicts Between Human-Touch and Innovation:

Participants highlight a notable tension between embracing kitchen innovation and preserving the irreplaceable human touch in cooking. The clash becomes evident when comparing the benefits of modern technologies—such as IoT devices, virtual glasses, and augmented commensality—with the desire to maintain the warmth and personal connection of traditional food practices. Participants express a conflict between the ease of accessing recipes through technology and the intrinsic value of shared culinary experiences and relationships. This extends to the archiving of recipes, where digital platforms offer convenience but lack the personal touch and customization of traditional notebooks. Despite valuing both digital and manual methods, participants highlight the challenge of integrating technological advancements while preserving the essence of familial cooking traditions and the human-touch element. This conflict indicates the need for a balance that respects traditional practices while accommodating innovative advancements in the kitchen.

Conflicts Between Sustainable Choices and Convenience:

Participants reveal a key conflict between sustainability and convenience in their food practices. They emphasize the importance of sustainable and locally sourced foods, driven by concerns over product authenticity and the impact on soil health. This preference for local markets over supermarket products reflects a desire to preserve genuine flavors and support local economies. However, this commitment to sustainability contrasts with the convenience of pre-prepared food options. This tension highlights the complex decision-making process where health-conscious goals intersect with the practical appeal of convenient alternatives.

The dynamic between sustainability and convenience underlines the complex trade-offs individuals face as they strive to balance eco-friendly choices with the appeal of convenience foods. Research on young adults indicates that time constraints affect their home cooking habits, with regular cooking linked to lower fast food consumption and better dietary outcomes. This highlights the need for interventions to teach young adults how to prepare quick, nutritious meals [30]. Participants recognize the health benefits of home cooking, even when preparing items perceived as less healthy, like fried foods or desserts. Conversely, media and marketing studies in the UK and USA point to a decline in home-cooked meals, attributed to busy lifestyles and a reliance on convenience foods [34]. Digital technologies present opportunities to enhance sustainable food practices and engage with food ethics. Exploring these themes constructively can advance Human-Food Interaction (HFI) research [18].

Conflicts Between Preserving Culinary Traditions and Social Media Effect:

Social media, particularly platforms like Instagram, YouTube, Facebook, and Twitter, influences food-related practices, integrating recipes, restaurant reviews, food photography, and culinary hashtags into daily routines [32]. These platforms profoundly impact young adults' dietary habits [44], often shaping their meal choices and preparation methods. Despite participants' intent to preserve traditional culinary practices, they acknowledge that social media frequently dictates their dietary preferences, leading to the adoption of recipes and trends encountered online. This digital influence challenges adherence to traditional food practices and suggests a potential shift toward technologically-driven or standardized recipes. Participants anticipate incorporating more social media-inspired recipes in their future diets, reflecting a conflict between emerging health trends and established culinary norms. Future research should explore ways to enhance the visibility of traditional recipes on digital platforms to support their continued relevance and transfer across generations.

Conflicts Between Desired Diversity and Concerned Standardization:

A delicate interplay exists between the desire for culinary diversity and personalization and the trend toward recipe standardization driven by technology. This conflict highlights the tension between maintaining a wide range of food experiences, both traditional and global, and the homogenizing effects technology can have on cherished recipes. While technology offers opportunities to broaden culinary possibilities, it also raises concerns about the erosion of uniqueness in family recipes, which are often underrepresented online. As individuals seek to preserve culinary uniqueness amidst contemporary technological influences and popular trends, the challenge becomes finding a balance that respects traditional practices while incorporating modern innovations.

Food, while essential for survival, has transformed into the world's largest industry and a key element of social interaction [7]. Family-specific dishes, often marked by unique ingredients known only within the family, represent a culinary "trademark" [29]. For home cooks, preparing these traditional meals is a way to

build familial identity and connect with heritage [38]. Therefore, preserving culinary heritage involves not just conservation but also the promotion, reproduction, transmission, and transformation of traditions [45]. As West points out, the fear of losing these traditions drives their preservation, a sentiment reflected in our study. Participants frequently expressed concerns that modern changes could undermine traditional family meals, emphasizing the emotional and nostalgic value of "home-cooked" meals as symbols of familial togetherness.

5.3 Considerations for Future Design

During the expert workshop, participants proposed innovative solutions to address conflicts between technology and food practices, focusing on balancing technological advancements with the preservation of cultural traditions, sustainability, and culinary diversity. Despite the observed decline in conservation values—such as tradition, conformity, and security—among Millennials in the country where the study was conducted, as well as the diminishing emphasis on self-transcendence (harmony) and collectivism over time [33], the workshop teams universally prioritized the preservation of traditional values and practices. They emphasized the importance of maintaining cultural heritage and integrating technology to facilitate its transmission across generations.

The participants highlighted the role of community and interpersonal relationships in preserving and sharing cultural values. For instance, Team 3 proposed an app integrated with social media to foster intercultural interaction, promote culinary diversity, and transmit traditional tastes and techniques. The app would use artificial intelligence (AI) to capture images of traditional cooking methods, enabling users to record and share practices passed down through generations. Cooking technologies could further embed cultural contexts, such as pre-programmed settings for traditional recipes and ingredient substitutions, offering a blend of tradition and innovation. These suggestions reflected a broader recognition of the need to balance continuity with adaptation, ensuring traditional practices remain relevant in modern contexts.

To resolve the tension between human touch and technological innovation, participants suggested incorporating familial and cultural elements into smart kitchen devices. These could allow users to replicate family recipes, participate in collaborative cooking sessions, or use platforms like Team 4's proposed "Ask My Grandma" app, which integrates multimedia features such as audio from elders and personal annotations. This approach would preserve the authenticity of traditional recipes while leveraging the convenience of digital tools, fostering stronger interpersonal and intergenerational bonds. Rather than replacing human involvement, technology was seen as a means to augment and support traditional knowledge transmission.

Sustainability also emerged as a key theme, addressing the conflict between environmentally friendly practices and the convenience of modern technology. Team 4 proposed promoting heirloom seeds to preserve authentic flavors and integrating traditional recipes into platforms like "e-seed," which combines genealogy with culinary traditions. Virtual farmers' markets could connect consumers with local producers, offering AI-powered shopping recommendations to encourage sustainable choices. Additionally, AI tools could suggest recipes based on available ingredients, enabling users to make eco-friendly decisions without sacrificing convenience, thereby emphasizing the responsible use of local resources. These efforts highlight how technology, when used thoughtfully, can promote sustainability while aligning with cultural and environmental values.

Social media's influence on culinary traditions was acknowledged for its dual potential to preserve and challenge traditional practices. Collaborative campaigns with influencers could promote traditional cuisines and engage users through hashtags, spotlighting cultural heritage. To ensure accuracy and protect personal space, Team 1 proposed managing sharing practices, while Team 2 suggested developing AI-powered platforms to digitize and archive traditional recipes. These platforms could integrate historical context, interactive tutorials, and virtual cooking communities where users participate in live-streamed workshops led by cultural experts, leveraging social media to enhance cultural continuity. While social media can sometimes distort traditional practices, its strategic use can reinforce and amplify cultural preservation efforts.

Participants also explored solutions for maintaining culinary diversity amidst the risk of technological standardization. Team 2 proposed AI-powered recipe recommendation systems offering personalized suggestions based on individual tastes and cultural backgrounds, ensuring diversity while accommodating global trends. These systems could allow users to interpret and save recipes, reflecting the evolving nature of food. Digital archives could preserve family recipes and stories for future generations, while smart recipe customization tools could help users adapt traditional recipes without losing their essence, as suggested by Davis [14]. This balance between innovation and tradition was a recurring theme throughout the workshop discussions, reinforcing the idea that technology should serve as an enabler rather than a replacement of human agency in cultural preservation.

Overall, the workshop findings emphasized that technology alone does not resolve conflicts between modern innovation and traditional food practices, but it provides influential benefits when combined with human awareness and effort. The proposals across teams reflected a commitment to fostering community relationships, embracing innovation while respecting tradition, and promoting sustainability. By integrating digital tools thoughtfully, technology can enhance food practices while safeguarding cultural values, demonstrating that the resolution of tensions requires both technological support and human engagement.

5.4 Limitations

As every study, this study has its own limitations. Firstly, this study focused particularly on young adults aged 20–25 to examine their practices and explore how technology could support traditional food practices. Delimiting the scope with this target age group was a deliberate choice to unfold the possible value clashes between the use of technology driven sources when interacting with food and the original nurturing habits encountered within the family.

The exclusion of older individuals who actively preserve traditional practices restricted the study's scope, as their inclusion could have provided valuable intergenerational insights. Additionally, the participant pool primarily consisted of educated urban

dwellers in Türkiye. Including young adults from rural settings, or young adults living in urban areas in different countries might have yielded different perspectives especially with respect to diversify the value perspectives. Similarly, the absence of participants with ethically motivated dietary habits, such as vegans or vegetarians, limited the exploration of this demographic's practices. Insights about such habits was not intended to be excluded, however did not occur in the participants' responses. Expanding the study with cross-cultural context would further extend the themes as well as the value mappings derived from young adults' insights.

The workshops also faced participant-related constraints. While they included academic designers and chefs, the exclusion of other stakeholder groups, such as rural restaurant owners, market vendors, traditional cooks, or homemakers, may have limited the diversity of insights. Although these groups were considered, the decision to prioritize English-proficient participants familiar with academic terminology aimed to ensure workshop efficiency. Another limitation was the absence of social scientists, such as anthropologists or historians, whose involvement could have provided alternative perspectives and enriched discussions. This decision was made to maintain Human-Computer Interaction (HCI) perspective as it lies in the intersection of Value-Sensitive Design (VSD) and Human-Food Interaction (HFI).

The adaptability of food practices, shaped by individuals' cultural and social contexts, underscores the importance of considering these factors in research. The VSD framework, which highlights the significance of integrating cultural and social values, suggests that findings may vary across different contexts and cultures [8]. Acknowledging this variability, the study employed an iterative process to refine tools for exploring HFI within a VSD framework. This approach supports the development of technologies that respect cultural practices and value systems, as outlined in previous research [5].

6 Conclusion and Future Work

This research was undertaken to gain insights into the dynamics of young adults' food practices, specifically exploring the interaction between technology and tradition. Employing a value-sensitive design (VSD) approach as our analytical lens, we aimed to unravel the intricate nuances shaping these food practices. This study elucidates five themes that describe pivotal insights concerning the food practices of young adults, viewed through a value-laden lens, derived from in-depth interviews and surveys. These insights, encapsulated as "Nurturing Relationships and Knowledge," "Embracing Tradition," "Unique Experiences," "Global Curiosity," and "Technological Convenience," represent prioritized values within the context of young adults' food-related behaviors. The examination of these themes is grounded in the Schwartz' inventory for describing universal values [39]. According to this framework, our analysis showed four value conflicts: "Technological Convenience and Cultural Food Practices," "Human-Touch and Innovation," "Desired Diversity and Concerned Standardization," and "Sustainability and Convenience," underscoring the intricate interplay of values shaping young adults' food choices.

As HFI scholars suggested, undertaking everyday food practices in a natural environment is crucial to reflect contextual sensitivities and respect the situated nature of local food cultures, contributing to a holistic and culturally sensitive approach [19]. Participants deeply value preserving their family's culinary heritage and see technology as an invaluable tool for learning and cooking. They are passionate about maintaining and passing down familial recipes, recognizing their personal and cultural significance. Researchers note that HCI professionals can help make food practices more resilient and forward-looking while preserving cultural heritage by developing technology that respects cultural contexts [35]. Additionally, they appreciate culinary diversity and customization, reflecting their curiosity about global cuisine. This harmonious blend of tradition, technology, diversity, and curiosity shapes their approach to cooking, resulting in a vibrant culinary landscape that honors the past while embracing the present. The evolving nature of young people's perspectives necessitates an openness to change and innovation, even if it may result in conflict with traditions.

Future research endeavors should prioritize the integration of young individuals into existing systems, leveraging technological advancements and available opportunities to facilitate intergenerational knowledge exchange. Such efforts must strive to concurrently uphold the values of conservation and diversity, ensuring the preservation of cultural heritage while embracing the dynamism of young adults. Recognizing food practices as complex, socially and emotionally charged events, HFI should promote hands-on learning, fostering common-sense food knowledge over automation [19]. Participants exhibit a cautious optimism toward kitchen innovation, foreseeing the integration of IoT products to digitize objects and facilitate shared meals using virtual glasses. Despite technological strides, there's a unanimous appreciation for the human touch in cooking, with concerns voiced about the potential drawbacks of fully robotic systems. There is a collective desire for accessible communication channels, with a preference for social media as a means to discover and share recipes. Participants emphasize the practicality and ease of use of technology in the kitchen, envisioning streamlined devices and apps that simplify recipe access. The challenge lies in striking a delicate balance between technological efficiency and preserving cultural richness and human elements in the cooking process. In an ideal scenario, there should be support for the cautious integration of IoT, accessible digital communication channels, practical kitchen tools, efficient recipe access, and the preservation of cultural richness through technological advancements, ensuring a harmonious coexistence.

To the best of our knowledge, this study is the first to provide an exemplar for incorporating Value-Sensitive Design approach as an analytical lens into Human-Food Interaction research. We hope that our methodological approach in understanding young adults' food practices would serve an inspiration for designers, researchers and practitioners for their future work in creating new paths on this topic.

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