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*Local food as a critical factor of sustainable food systems*

# The consumer perception of local food through different types of proximity

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*To my parents, who taught me to*

*care for people, respect nature and believe in fairness*

*long before I learned to call them the pillars of sustainability*

*Szüleimnek,*

*akik megtanítottak*

*az emberekről való gondoskodásra,*

*a természet tiszteletére*

*és az igazságosságba vetett hitre*

*–*

*jóval azelőtt, hogy mindezt*

*a fenntarthatóság pilléreiként ismertem volna meg*

*Local food as a critical factor of sustainable food systems*

**The consumer perception of local food through different types of proximity**

Thesis for obtaining a PhD degree in the Doctoral School of Management Sciences and Business Administration of the University of Pannonia

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# Abstract

Sustainable food-system transitions demand approaches that move beyond a narrow "food miles" lens, given the environmental, social and economic burdens of current regimes (Willett et al., 2019; Gerten et al., 2020). Yet "local" remains contested: early views centred on distance or borders, while newer accounts highlight relational trust, symbolic value and cultural embeddedness (Tregear, 2007; Eriksen, 2013; Fernández-Ferrín et al., 2017). This dissertation develops and validates a multidimensional framework for consumer perceptions of local food, grounded in Eriksen's three-domain proximity model and informed by Construal Level Theory (Trope & Liberman, 2003) and Social Representation Theory (Moscovici, 1961).

A three-phase mixed-methods design was used: conceptualisation via literature, field engagement and qualitative exploratory research; operationalisation through item development and psychometric checks; and empirical testing in a nationally representative Hungarian survey.

According to the findings ,exploratory and confirmatory factor analyses converge on a robust three-factor structure (geographic, relational, value) that clearly outperforms a unidimensional alternative. Linking perception to behaviour reveals asymmetric effects. Value proximity is the strongest and most consistent predictor of willingness to pay, with effects intensifying among higher-WTP consumers (Feldmann & Hamm, 2015; Haas et al., 2021). Geographic proximity primarily drives purchase frequency and supports lower/median WTP groups, underscoring the centrality of access and convenience (Birch et al., 2018; Doernberg et al., 2022). Relational proximity has weaker direct effects but enables credibility and loyalty (Memery et al., 2015). Demographic patterns are systematic: older adults and women report higher proximities; lower-income groups emphasise geographic and value proximity, while relational ties are broadly income-independent.

The study presents a validated scale and theory-consistent framework that clarifies the meaning of "local" as the integration of spatial, social and value signals. Practically, it supports proximity-profile segmentation and communication that pairs access with salient value cues. For policy, it motivates multidimensional interventions that combine infrastructure, value-based education and labelling, and trust-building programmes—so that everyday choices align with wider goals of equity, resilience and sustainability.



**Keywords:** *local food; perceived proximity; consumer perception; consumer research*

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## 1.1 Figures

## 1.2 Tables

**List of abbreviations**

| | |
|---|---|
| AIC | Akaike Information Criterion |
| ANOVA | Analysis of Variance |
| AVE | Average Variance Extracted |
| BIC | Bayesian Information Criterion |
| BP | Breusch–Pagan test |
| CAP | Common Agricultural Policy |
| CFA | Confirmatory Factor Analysis |
| CFI | Comparative Fit Index |
| CI | Confidence Interval |
| CLT | Construal Level Theory |
| COVID-19 | Coronavirus Disease 2019 |
| CR | Composite Reliability |
| CSA | Community Supported Agriculture |
| df | Degrees of Freedom |
| ECI | European Citizens' Initiative |
| EESC | European Economic and Social Committee |
| EFA | Exploratory Factor Analysis |
| EPRS | European Parliamentary Research Service |
| EU | European Union |
| f | frequency |
| FA | Factor Analysis |
| FAO | Food and Agriculture Organization of the United Nations |
| FIML | Full Information Maximum Likelihood |
| Gen Z | Generation Z |
| GHG | Greenhouse Gas |
| H | Hypothesis |
| ha | hectare |
| HoReCa | Hotels, Restaurants, Cafés / Catering |
| HSD | Honestly Significant Difference (Tukey HSD) |
| HTMT | Heterotrait–Monotrait Ratio |
| ICA | Independent Component Analysis |
| ICC | Intraclass Correlation Coefficient |
| IQR | Interquartile Range |
| JRC | Joint Research Centre (of the European Commission) |
| KMO | Kaiser–Meyer–Olkin (measure of sampling adequacy) |
| KS | Kolmogorov–Smirnov test |
| KSH | Hungarian Statistical Office |
| KW | Kruskal–Wallis test |
| LCA | Life Cycle Assessment |
| LFS(s) | Local Food System(s) |
| LM3 | Local Multiplier 3 |
| MLR | Maximum Likelihood Estimation with Robust Standard Errors |
| MSA | Measure of Sampling Adequacy |
| n | sample size |
| n.d. | No date |
| NDA | Network-based Dimensionality Analysis |
| NUTS2 | Nomenclature of Units for Territorial Statistics, level 2 |
| OI | Order of Importance |

| | |
|---|---|
| OOB | Out-of-Bag error (Random Forest) |
| OR | Odds Ratio |
| PC | Principal Component |
| PCA | Principal Component Analysis |
| PDO | Protected Designation of Origin |
| PGI | Protected Geographical Indication |
| RMSEA | Root Mean Square Error of Approximation |
| RMSR | Root Mean Square of Residuals |
| RQ | Research Question |
| SD | Standard Deviation |
| SDGs | Sustainable Development Goals |
| SEM | Structural Equation Model |
| SFSC(s) | Short Food Supply Chain(s) |
| SRMR | Standardized Root Mean Square Residual |
| TLI | Tucker–Lewis Index |
| TRUEFOOD | Traditional United Europe Food project (EU FP6 project) |
| TSG | Traditional Speciality Guaranteed |
| UK | United Kingdom |
| UN | United Nations |
| USDA | United States Department of Agriculture |
| VIF | Variance Inflation Factor |
| WoS | Web of Science |
| WTP | Willingness to Pay |
| $\alpha$ | Cronbach's alpha |
| $\beta$ | Beta coefficient (regression coefficient) |
| $\delta$ | Cliff's Delta (effect size symbol) |
| $\Delta$ | Delta |
| $\Delta$AIC / $\Delta$BIC | Difference in Akaike/Bayesian Information Criterion |
| $\Delta\chi^2$ | Chi-square difference test |
| $\eta^2$ | Eta squared (effect size) |
| $\rho$ | Spearman's rho (rank correlation coefficient) |
| $\tau$ | Quantile level (in quantile regression) |
| $\chi^2$ | Chi-squared test |
| $\omega^2$ | Omega-squared (effect size) |

# 2 Introduction

Ensuring the sustainability of food systems is one of the most urgent global challenges of our time, as current practices contribute significantly to environmental degradation, social inequality, and economic inefficiencies (Willett et al., 2019; Gerten et al., 2020). In response, alternative food systems (such as local food systems and short food supply chains) have gained increasing attention. These systems are not meant to solve the global food crisis on their own, but they are essential building blocks of future food system transformations, much like the capillaries in a body, they carry vital functions that enable larger systems to thrive. Without them, the transition to a more sustainable and resilient food future would not be feasible.

Despite this growing attention, the concept of local food remains poorly defined and inconsistently understood, particularly from the consumer perspective. Over-simplifying the notion of local food (such as reducing it to mere geographical proximity) risks overlooking important dimensions of how consumers engage with it. Consumer perceptions of local food are shaped not only by physical distance but also by emotional, relational, and value-driven considerations (Eriksen, 2013; Fernández-Ferrín et al., 2017). A one-dimensional approach fails to capture this complexity, leading to confusion in both academic discourse and practical implementation. Although theoretical discussions form a proximity theory point of view in local food systems are not novel, there is a noticeable lack of empirical research that systematically explores how the different perceived proximity dimensions interact and influence consumer perceptions. This gap in the literature is especially relevant for supporting evidence-based policymaking and the effective promotion of sustainable local food strategies.

My dissertation addresses this gap by proposing and empirically testing a **novel proximity-based framework for understanding consumer perceptions of local food**. The main research question is: **How do consumers perceive local food through different proximities?** To answer this, the study builds upon qualitative exploratory research with the development and validation of a measurement scale, followed by a quantitative consumer survey representative of the Hungarian population. Several hypotheses are tested to explore how proximity influences willingness to pay and purchase frequency, and how perceptions vary across socio-demographic groups (age, gender, income). The resulting concept, grounded in Eriksen's (2013) three-domain proximity theory, provides a new way of empirically capturing the nuanced meanings of local food. By doing so, the dissertation offers both conceptual clarity and practical tools to support inclusive, context-sensitive, and sustainable food system transitions.

## 2.1 Research goals

The primary objective of this dissertation is to gain a deeper understanding of how consumers perceive local food, with a specific focus on the role of perceived proximities. While local food is often interpreted through the lens of geographic distance, this research argues that **consumer perceptions are shaped by a more nuanced interplay of dimensions**: geographic, relational, and value-based proximity. These reflect not only the physical location of food production, but also the emotional, social, and symbolic connections that consumers associate with local food.

To explore this phenomenon, the research was structured in three interconnected phases. The study aims to (1) conceptualize consumer perception of local food using a proximity-based framework; (2) construct and statistically validate a measurement scale to capture these dimensions; and (3) examine how proximity perceptions vary across socio-demographic groups in Hungary, and how they influence consumer behaviour, particularly willingness to pay and purchase frequency.

*Table 1 Goals of the research*

| **Goal** | **Understand the consumer perception of local food based on different types of proximities** |
|---|---|
| **Aim 1** | Build up a novel theoretical framework for the consumer understanding of local food based on different proximities. |
| **Aim 2** | Build up a scale to measure the consumer understanding of local food based on different perceived proximities. |
| **Aim 3** | Investigate how Hungarian consumers understand local food, and examine how these perceptions differ across demographic groups and relate to purchase behaviour. |

Source*: Self-edited table*

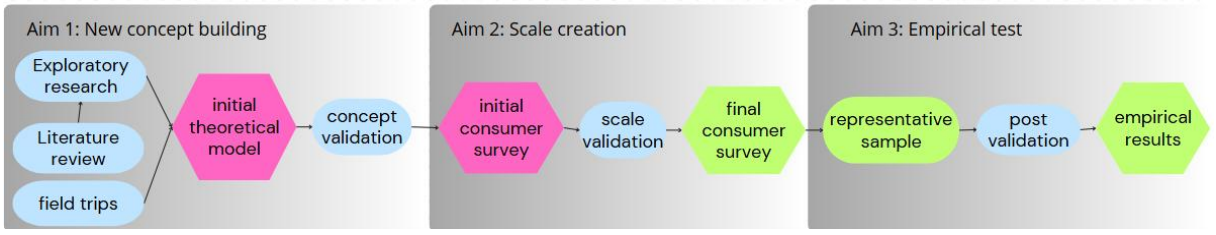


*Figure 1 The flow of research*

Source*: Self-edited figure*

The first phase focused on developing a novel theoretical framework that conceptualises how different types of proximity influence consumer perception. This framework was informed by an extensive literature review, exploratory research, and direct field engagement through research camps and producer shadowing (observing producer working).

The second phase aimed to construct and validate a measurement scale to capture the three proximity dimensions. This involved the design and statistical validation of a consumer survey,

based on the theoretical framework. In the third phase, the model was empirically tested using a representative sample of Hungarian consumers, allowing for hypothesis testing and the analysis of demographic differences in proximity perception.

Based on the developed framework, the following research questions and hypotheses were formulated. The aim is to clarify the role of perceived proximities in shaping consumer behaviour and to examine how socio-demographic variables influence these perceptions (see Chapter 5.2 for hypotheses and theoretical justification).

**RQ1 What is the consumer perception of local food amongst Hungarian consumers?**
Exploratory in nature

**RQ2: What types of proximity influence Hungarian consumers' perception of local food?**
**H2.1:** Hungarian consumers perceive local food through multiple proximity dimensions, including relational and value proximity alongside geographic proximity.

**RQ3: How do demographic characteristics influence Hungarian consumers' perceived proximity of local food?**
**H3.1:** Consumers' perception of local food varies across different age groups.
**H3.2:** Consumers' perception of local food differs between genders.
**H3.3:** Consumers' perception of local food varies based on income levels.

**RQ4: How does the perception of local food relate to consumers' willingness to pay (WTP) and purchase frequency?**
**H4.1:** Value proximity, relational proximity, and geographic proximity have an effect on consumers' willingness to pay for local food.
**H4.2:** Value proximity, relational proximity, and geographic proximity have an effect on consumers' purchase frequency of local food.

## 2.2 Structure of the dissertation

The structure of the dissertation follows a logical progression from theory to empirical investigation and, finally, to synthesis and implications. After the introductory chapter, the literature review (Chapter 3) establishes the conceptual background by examining the unsustainability of current food systems, discussing short food supply chains and local food systems, and clarifying the ambiguous concept of "local food." Proximity theories, including Eriksen's (2013) three-domain model and construal level theory, are introduced alongside consumer perception theory, leading to the formulation of the problem statement.

The subsequent chapters describe the empirical research (Chapter 4 and 5). This part sets out the research aims, hypotheses, and methodological triangulation, followed by the exploratory phase and the development of the theoretical framework. It also details the design of the consumer questionnaire, the application of psychometric methods, and the implementation of the representative Hungarian survey, including sampling and data preparation steps.

The results chapter (Chapter 6) presents the hypothesis testing in a structured manner. It reports on the validation of the measurement model, group comparisons by age, gender, and income, and analyses of willingness to pay and purchase frequency using regression and machine learning methods. Each section concludes with interpretations that connect the empirical findings to the overarching research questions.

The dissertation closes with a synthesis of results, highlighting theoretical contributions, practical implications, and directions for future research (Chapter 7). Dedicated sections outline the academic, practitioner, and policy relevance of the findings (Capther 8). Finally, Chapter 9 contains the references, while Chapter 10 provides the appendices, including the detailed presentation of the validation process.

# 3 Literature review

The first half of the dissertation provides the theoretical foundation, given the complex and multifaceted nature of food systems and consumer behaviour, the review draws on an interdisciplinary body of knowledge from sustainability science, food science, consumer psychology, and marketing. The aim is to map the current academic landscape and to identify conceptual ambiguities and research gaps that justify the need for this study. The literature review outlines key sustainability challenges in food systems, then turns to local food systems and short food supply chains as possible alternatives. It examines how 'local' is understood across geographic, relational, and value-based dimensions, supported by proximity theories. Finally, it draws on consumer perception theory to inform the model development.

**Principles of the literature review**

The literature review adopts a **hermeneutic approach**, which emphasizes iterative engagement with the literature to build up a deeper understanding and more refined insights. By integrating a range of diverse perspectives, this approach enables a thorough exploration of the topic (Boell and Ćećez-Kecmanović, 2011; Eriksen, 2013). This methodology supports a comprehensive understanding of the subject through continuous reflection and synthesis. In line with this method, I began with the identification of key articles, which served as starting points to discover additional relevant research. Unlike systematic reviews, which follow a rigid and structured framework, the hermeneutic approach allows for greater flexibility, useful when we explore complex concepts such as consumer perceptions. To ensure a broad and up-to-date overview, the literature search was conducted iteratively between 2021 and 2025, primarily using the Web of Science database. This was complemented by searches on Google Scholar to capture emerging publications, including those outside mainstream academic journals.

The hermeneutic approach should be applied with its limitations in mind. The iterative and interpretive nature of this method can introduce **subjectivity**, as prior assumptions may subtly influence both how literature is interpreted, and which sources are included. This may lead to confirmation bias or inconsistencies in source selection across different researchers, limiting replicability. Additionally, the open-ended character of the process can make it time-consuming and less transparent than structured methodologies.

On the other hand, this same **flexibility** allows the inclusion of diverse sources beyond peer-reviewed literature. For example, grey literature, reports, or emerging research outputs—often overlooked in strictly systematic reviews—can be integrated more easily. While some systematic reviews do attempt to incorporate such sources through explicit search strategies, the hermeneutic approach facilitates their inclusion.

The method encourages a deeper, context-sensitive understanding of literature. By allowing continuous refinement through citation tracking and recursive reading (Boell and Ćećez-Kecmanović, 2010), it is particularly suited for areas where theoretical framing and cultural nuances play a significant role, such as in the social sciences (Geeling et al., 2016). This review was guided by these principles to construct a critically informed theoretical foundation for the research, while also aiming to engage more deeply with the literature to foster a nuanced understanding of the topic.

## 3.1 Our food systems are not sustainable

There is a general agreement amongst the scientific community that our food systems are not sustainable, primarily due to its' profound environmental, economic, and social impact. The global food system stands at a critical crossroad, facing a dual challenge: over 3 billion people suffer from food insecurity, while food production continues to be a major driver of climate change, biodiversity loss, and pollution (Willett et al., 2019). According to estimates from the Stockholm Resilience Centre, the Earth's resources could theoretically support the nutrition of 10.2 billion people without exceeding planetary boundaries (Gerten et al., 2020). However, much of today's food production exceed these limits, indicating the unsustainable nature of our current practices. There is a long way ahead for mankind to define the sustainable food systems of the future, as food related issues are integral to achieving at least 12 of the 17 Sustainable Development Goals[1] (Chaudhary, Gustafson, Mathys, 2018). In the following section, I examine the main sustainability concerns, structuring them according to the three pillars of sustainability.

### *3.1.1 Environmental aspect*

Current food systems are widely regarded as unsustainable from an environmental standpoint, primarily due to the depletion of resources, greenhouse gas emissions, biodiversity loss, and significant waste generation. Modern food systems place considerable **pressure on natural resources** such as water, land, and energy, which are consumed faster than they can regenerate, treating food as a limited resource similar to fossil fuels (Holden et al., 2018; Hatjiathanassiadou et al., 2023). This overuse of essential resources strains the planet's ability to maintain sustainable food production.

The food industry consumes a significant amount of global freshwater resources, with agricultural production accounting for the largest share. The concept of the **water footprint** quantifies the total water used in food production, including green (rainwater), blue (surface and groundwater), and grey (water needed to dilute pollution) components (Lovarelli et al., 2016; Hu et al., 2019). Population growth, urbanization, and shifts toward more **water-intensive diets** (e.g., higher meat and dairy consumption) are driving up the water footprint of food production and consumption (Gerbens-Leenes and Mekonnen, 2020; Zhao et al., 2020). Besides these sustainability concerns, food safety issues such as the **presence of pesticide**

[1] Sustainable Development Goals (SDGs) address the global challenges the population faces, including those related to poverty, inequality, climate change, environmental degradation, peace and justice. The 17 Goals are all interconnected, and the aim is to achieve them all by 2030.

**residues** in various food commodities, particularly fruits and vegetables, also deserve attention and require effective risk communication (Quirós-Alcalá et al., 2019; Kasza et al., 2022). Animal-based foods, especially beef, have higher water footprint compared to plant-based foods (Costa et al., 2024; Hu et al., 2019). Addressing these challenges requires improved water use efficiency, dietary changes, technological innovation, and better management of food production and consumption (Gerbens-Leenes and Mekonnen, 2020; Zhao et al., 2020).

Soil is a particularly important component of sustainable agriculture, but agricultural practices and other human activities have led to **soil degradation** worldwide. Soil degradation has far-reaching consequences, as it reduces soil fertility, erodes biodiversity, and leads to reduced agricultural productivity (Lal, 2015), increases soil erosion, loss of organic carbon, and greenhouse gas emissions (Prăvălie, 2021). Globally, about 25% of land and 40% of agricultural land face degradation, especially in regions like Sub-Saharan Africa and India (Ferreira et al., 2021).

Food production is a major contributor to **greenhouse gas emissions**, particularly from agricultural practices like livestock farming, which release large amounts of methane and other gases that drive climate change (Hofman-Bergholm, 2022; Hatjiathanassiadou et al., 2023). In addition to emissions, the expansion of agricultural land and the widespread use of monocultures have led to **habitat destruction** and a severe **decline in biodiversity**, undermining vital ecosystem services that are essential for environmental stability and resilience (Hofman-Bergholm, 2022; Benton, 2019). Nearly a third of the food produced globally is wasted, resulting in a significant loss of valuable resources and further environmental harm due to production and disposal processes (Kasza et al., 2019). Consumer behaviour also plays a critical role in shaping the environmental impact of food systems (Vittuari et al., 2023). Shifting dietary patterns, especially reducing the consumption of resource-intensive foods like meat and dairy, is a crucial step toward achieving sustainability (Hatjiathanassiadou et al., 2023).

### *3.1.2 Economic aspect*

The economic unsustainability of the current global food system is driven by several interconnected factors. The food sector faces resource shortages and food loss throughout the supply chain, coupled with a traditional **linear economic model**. This model, along with high levels of food waste, leads to substantial economic losses, inefficiencies, and increased costs within the food system (Tóth and Zachar, 2021).

The current food system also aggravate economic inequality, as disparities in food access and distribution contribute to both hunger and obesity. These issues reflect inefficiencies in food allocation (Tóth and Zachar, 2021; Hofman-Bergholm, 2022). Despite global food production possibly being sufficient to meet demand, markets remain profit-driven, and the **unequal distribution** of food resources furthers hunger and poverty (Bliss, 2019). This is evident in how food dollars are distributed across the supply chain, with significant portions going to intermediaries rather than producers (USDA Food Dollar Series, 2024), while major food-producing regions like the EU generate substantial export revenues (€182 billion) even as food insecurity persists globally (FoodDrinkEurope, 2024). If **food waste** were minimized and distribution systems improved, these imbalances could theoretically be addressed, potentially eliminating hunger-related deaths (Tóth and Zachar, 2021).

Diet-related diseases, including cardiovascular conditions (such as hypertension, heart attacks, and strokes), obesity, diabetes, certain cancers, osteoporosis, and metabolic disorders, are major contributors to mortality (Alberti et al., 2005). Beyond malnutrition, the rising obesity epidemic and its associated health complications also drive-up **healthcare costs**, putting additional pressure on economic resources (Benton, 2019). In the EU, approximately 20 million people are affected by disease-related malnutrition, costing governments up to €120 billion annually (Freijer et. al., 2013).

Global food systems, although interconnected, are often inflexible and vulnerable to various shocks. Events like Covid-19, or the Ukraine-Russia war disrupt food production and trade (Popp et al., 2024), leading to price increases and reduced access, particularly for vulnerable populations. These disruptions contribute to food insecurity and economic challenges (Kasza et al, 2024; Bilali and Hassen, 2024). Food systems are highly globalized, with the EU being both a major importer and exporter of food and feed. In 2018, the EU agri-food sector contributed €137 billion in exports and provided 43 million jobs, highlighting its economic importance (European Commission, 2020). In the long term, the food system's contribution to climate change and biodiversity loss imposes significant economic costs due to environmental degradation (Benton, 2019).

### *3.1.3 Social aspect*

We have witnessed progress in reducing **hunger and malnutrition** over recent decades, yet around 800 million people still lack access to a sufficient amount (or quality) of food, many residing in failing states and conflict zones. Additionally, about two billion people suffer from a deficiency of key micronutrients, such as iron, zinc, vitamin A, and iodine, commonly referred

to as hidden hunger. Meanwhile, approximately two billion people are overweight, contributing to a public health epidemic involving chronic conditions like Type 2 diabetes and cardiovascular disease (Oxford Martin Programme on the Future of Food, n.d.). Poor diets, driven by the availability and affordability of unhealthy food options, are responsible for more health issues than other major risk factors combined (Pretorius et al., 2021). The prevalence of diet-related diseases, such as obesity and diabetes, underscores the need for food systems that prioritize nutrition and public health. Integrating health considerations into food system governance can help address these challenges and promote healthier dietary patterns (Poppy and Baverstock, 2019).

This nutrition paradox is further deepened by **inequalities in resource distribution**. Despite advancements in agricultural productivity, many developing regions continue to struggle with food insecurity. The prioritization of market-driven food production over local food needs contributes to persistent disparities. The concept of agrifood debt illustrates this imbalance, where regions with high natural resource consumption and environmental impacts often do not align with regions experiencing high levels of social well-being (Oteros-Rozas et al., 2019). This disequilibrium highlights the need for a more socially equitable approach to food security.

**The well-being of farmers themselves** is a pressing social issue. Farmers face high rates of stress, anxiety, and depression, often exceeding those in the general population (Mactavish et al., 2019; Berg et al., 2019). Risk factors include financial pressure, isolation, climate stress, and physical strain (Wheeler et al., 2019). Young farmers are especially vulnerable, with time and income insecurity as key triggers (Berg et al., 2019). In this context, social farming provides a unique response: it integrates people with reduced work capacity into agricultural activities, creating therapeutic, solidarity-based environments (Farmwell, n.d.).

**Gender dynamics** also shape the social landscape of food systems. Women are essential contributors to European agriculture, yet they remain a socially underrecognized and structurally disadvantaged group. Gender norms, unequal access to resources, and limited decision-making power continue to lessen their full participation (Dabkienė, 2025; Marangudakis and Shortall, 2022). In family farming, particularly in Southern Europe, women's work is often invisible and undervalued (Rosa et al., 2022). Despite this, women operate around a third of EU farms and are redefining agricultural identities, especially among younger generations (Fanelli, 2022). Promoting gender-sensitive policy and targeted support is vital for unlocking women's full potential in agricultural innovation and sustainability transitions.

Broader **structural transformations** in agriculture have also had significant social consequences. The shift towards industrialized and globalized food production has marginalized traditional agricultural practices and local food systems. These industrial practices have led to the erosion of small-scale farming and traditional knowledge (Marchetti et al., 2020; Frison and Clément, 2020). Family-based agriculture, which often supports local economies and social cohesion, is increasingly overshadowed by large-scale monoculture farming. This transition not only threatens biodiversity but also undermines the social fabric of rural communities. Revitalizing and valuing traditional farming practices can foster social-ecological resilience and support local economies (Marchetti et al., 2020).

### *3.1.4 What the future holds*

Meeting the growing demand for nutritious food in the face of an increasing population, rising consumption levels, dietary shifts, and the resulting environmental degradation pose a significant challenge for humanity in the 21st century (Chaudhary, Gustafson, and Mathys, 2018). Addressing these challenges requires a fundamental reassessment of how we produce and consume food. The **interconnected** nature of these challenges makes achieving sustainability more complex. Food systems involve intricate relationships between human and natural systems, requiring a holistic, systems-based approach to tackle these issues effectively (Allen and Prosperi, 2016; Oliver et al., 2018). However, current policies often prioritize short-term economic benefits over long-term sustainability, hindering coordinated action across sectors and governance levels (Oliver et al., 2018; Shannon et al., 2015). Key issues that need to be addressed include **food waste**, reevaluating **meat** consumption patterns, and innovating **local food systems**. Moving forward, global food systems must ensure economic security for all stakeholders while tackling malnutrition, obesity-related health issues, and minimizing environmental impacts. This requires careful attention to planetary boundaries to avoid further destabilization of the Earth's systems (Chaudhary, Gustafson, and Mathys, 2018; Steffen et al., 2015).

A crucial step in this transition is the promotion of **sustainable land management** practices. Local food systems can contribute to this goal through reduced transportation infrastructure needs, lower land-use intensity, and enhanced biodiversity preservation, though their sustainability impact varies significantly by context. The restoration and innovation of local food systems represent one potential pathway towards sustainability, offering significant benefits beyond environmental considerations, encompassing climate resilience and enhanced community livelihoods (Ericksen, 2008).

Achieving sustainable food systems is a multifaceted challenge, influenced by environmental factors, social welfare considerations, and livelihood security (Ericksen, 2008). However, solutions must be tailored to **specific spatial and regional contexts**, as what works in one area may not be effective in another (Eakin et al., 2017).

Navigating this complexity presents a considerable challenge for policymakers and local decision-makers, especially in the face of **rapid social and environmental changes**. Despite these challenges, defining appropriate interventions and seeking expert guidance to achieve a more sustainable future remains paramount. This issue is of particular significance for Hungary, where rural areas, despite being well-suited for food production, face challenges such as declining populations, unemployment, and poverty (Ritter, 2018).

As shown across the three pillars of sustainability, the current food system is not equipped to meet future needs. This calls for a closer examination of alternative models, especially those that aim to reconnect producers and consumers, reduce environmental impacts, and support local economies. Short food supply chains and local food systems are widely recognised as part of such alternative food networks, and according to several authors (Hinrichs, 2000; Renting et al., 2003; Ilbery and Maye, 2005; Galli and Brunori, 2013; Kneafsey et al., 2013), they may offer **viable responses to the sustainability challenges** outlined above.

Although several pathways toward sustainability also exist, the present study concentrates specifically on SFSCs and LFSs, as they are frequently highlighted as promising alternatives in the literature. Therefore, in the following section, I focus on these systems to examine their potential contribution to a more sustainable food system.

## 3.2 Short food supply chains and local food systems

This section examines the conceptual and regulatory foundations of short food supply chains (SFSCs) and local food systems (LFSs). First, SFSCs are discussed in terms of their regulatory definitions and typologies, followed by an overview of LFSs. The section concludes with a comparison of the two concepts and a discussion of their benefits and criticisms.

### *3.2.1 Short food supply chains*

**Regulatory frameworks and definitions**

In recent times, the food market has witnessed a resurgence of traditional, direct methods of food delivery, alongside the emergence of **alternative supply chains** and innovative distribution systems that establish direct connections between producers and consumers (European Parliament, 2016). There is no generally accepted definition of SFSC within the scientific literature (Kneafsey et al., 2013). SFSCs are usually characterized by a **reduced number of intermediaries** between food producers and consumers, emphasizing local production and **direct sales**. These chains aim to **enhance sustainability** by integrating environmental, social, and economic dimensions.

The most frequently highlighted feature of SFSC is the **closeness** between producers and consumers. This closeness can be conceptualised in terms of **political boundaries** (Zepeda and Leviten-Reid, 2004), **physical distance** measured in kilometres (Chambers et al., 2007), or rarely in **time** (Zepeda and Leviten-Reid, 2004, cited by Paciarotti and Torregiani, 2021). The distance separating producers from consumers lacks a clear-cut definition, as it depends on various factors such as the physical layout, population demographics of an area, and the goals of the individuals or groups involved. Structurally, SFSC typically comprises two fundamental characteristics: a reduction in the number of intermediaries and a reduction in the number of food miles covered (Renkema and Hilletofth, 2022).

European Union regulatory frameworks developed for the 2014–2020 support policy period established formal definitions of SFSC. According to Article 2 of Regulation (EU) No 1305/2013, a short food supply chain involves a limited number of economic operators (Kneafsey et al., 2013), committed to cooperation, local economic development, and close geographical and social relations between producers, processors and consumers. This interpretation is complemented by Article 11 of Regulation (EU) No 807/2014, which restricts support to supply chains with no more than one intermediary between farmer and consumer.

Although these definitions were later adopted by the 2021–2027 CAP Strategic Plans, many countries still recognize only this earlier framework—if they recognize SFSCs at all.

While these regulatory definitions provide clear, measurable criteria for support programs, they often fail to capture grassroots, community-driven initiatives that emerge organically. This regulatory lag can exclude genuinely local initiatives from support, underscoring the disconnect between top-down policy concepts and bottom-up realities.

**Types of SFSC**

A wide range of typologies of SFSCs have been developed in the literature. Marsden et al. (2000) and later Renting et al. (2003) identified three main types of SFSCs—face-to-face, spatial proximity, and spatially extended—all of which emphasise different forms of connection between producers and consumers. Other authors have focused on the role of intermediaries, arguing that SFSCs are characterised by a minimal number of actors, ideally one or none, between the farmer and the consumer (Jarzębowski et. al., 2020). Such definitional debates underline the variety of ways in which "shortness" and "locality" can be operationalised across different contexts.

While these typologies are useful in highlighting the conceptual diversity of SFSCs, the Joint Research Centre of the European Commission (JRC) has developed a framework that is particularly relevant for the European policy context. Kneafsey et al. (2013) distinguish between sales in proximity and sales at a distance, both requiring that products remain traceable back to a named farmer, whether marketed individually or collectively.

**Sales in proximity** cover a broad spectrum of arrangements. These include Community Supported Agriculture (CSA) schemes and their equivalents, which operate on the basis of shared risks and benefits between farmers and subscribers. They also involve on-farm sales, such as farm shops, farm-based hospitality, roadside sales, and Pick-Your-Own arrangements. In addition, proximity encompasses off-farm sales in the commercial sector, including farmers' markets, farmer-owned outlets, food festivals and tourism events, consumer co-operatives, and retailers or HoReCa (Hotels, Restaurants, Cafés / Catering) establishments, provided the identity of the farmer remains visible. Furthermore, proximity sales extend to the catering sector, with supplies to schools, hospitals, and similar institutions, where the institution itself acts as the consumer.

**Sales at a distance**, on the other hand, include direct delivery schemes such as vegetable boxes, as well as internet sales and speciality retailers. While these lack the face-to-face interaction typical of other categories, they preserve the principle of transparency and traceability to a named farmer.

*Table 2 Overview of types of LFS/SFSC in the EU*

| | **Sub-classification** |
|---|---|
| *Sales in proximity* | CSA (Community Supported Agriculture)<br>- Variations across regions and countries<br>- Subscribers receive a share of the harvest for money and labour |
| | On Farm Sales:<br>- Farm shops<br>- Farm based hospitality<br>- Roadside sales<br>- Pick-Your-Own |
| | Off Farm Sales – commercial sector:<br>- Farmers' markets and other markets<br>- Farmer owned retail outlet<br>- Food Festivals / tourism events<br>- Sales directly to consumer co-operatives / buying groups<br>- Sales to retailers sourcing from local farmers (farmer identity visible)<br>- Sales to HoReCa (Hotels, Restaurants, Cafés) with clear farmer identity |
| | Off Farm Sales – catering sector:<br>- Sales to hospitals, schools, etc. (institution as consumer) |
| | Farm Direct Deliveries:<br>- Delivery schemes |
| *Sales at a distance* | Farm Direct Deliveries:<br>- Delivery schemes<br>- Internet sales<br>- Speciality retailers |

Source: *Self-edited table based on Kneafsey et al. (2013), page 26*

This typology (see Table 2) complements earlier conceptualisations by translating the idea of "shortness" into concrete and observable categories within the European context. It captures the diversity of SFSCs in practice, while also reflecting the EU's policy emphasis on transparency, trust, and the visibility of farmers within the food chain.

**Philosophical foundations and value system**

Beyond these operational aspects, short food supply chains are grounded in deeper philosophical and value-based principles that distinguish them from conventional food systems.

Recent research confirms that **sharing, authenticity, and environmental sustainability** are widely recognized as foundational conceptual pillars of Short Food Supply Chains (SFSCs). The idea of the three core pillars has been most explicitly conceptualised by Petropoulou and Paschou (2022), while complementary studies emphasise specific aspects: sharing through

relational ties, mutual trust, and collective resource use (Vittersø et al., 2019), **authenticity** through originality, honesty, and links to local identity and heritage (Jarzębowski et al., 2020), and **environmental sustainability** through transparency, participatory governance, and ecological justice (Doernberg et al., 2022; Malak-Rawlikowska et al., 2019). Together, these pillars position SFSCs as integral components of a wider social and environmental movement that seeks to address the limitations of mainstream food systems.

Real-world SFSC initiatives frequently operate through **community relationships and trust** networks that transcend neat geographical boundaries, informal arrangements that may involve more than one intermediary while still maintaining the spirit of "shortness," cultural and social connections that go beyond the purely economic focus of regulations, and innovative distribution models that do not conform to traditional producer-intermediary-consumer chains. The essence of SFSC is that it is based on the trust and **honesty** between farmers and consumers (Paciarotti and Torregiani, 2021), and relies on a foundation of **transparency**, **cooperation**, and **shared governance** among supply chain actors (Taylor, 2005; Stevenson and Pirog, 2008, quoted by Paciarotti and Torregiani, 2021).

**Sustainability and critical perspectives**

SFSCs can be also interpreted as a value chain that ensures both social and economic benefits for supply chain participants while also promoting **sustainability** by avoiding permanent depletion of natural resources (FAO, 2014). As I see, sustainability emerges as a significant factor, with numerous studies describing their benefits compared to traditional food systems (Galli and Brunori, 2013; Aubert and Enjolras, 2016). However, it's important to see that a short food supply chain isn't inherently more sustainable than conventional alternatives (as detailed in subchapter 3.2.4 Benefits and criticism of the sustainability of LFSs and SFSCs). The relationship between "shortness" and sustainability is complex and context-dependent, as sustainability outcomes depend on multiple factors including production methods, transportation efficiency, processing techniques, and broader systemic impacts that extend beyond the structural characteristics typically used to define SFSC. Achieving genuine sustainability requires careful consideration of many dimensions throughout the entire supply chain.

SFSC is a complex phenomenon, and as there is a lack of a universally accepted definition, there is also a lack of standardized categorization (Paciarotti and Torregiani, 2021). Indeed, it's much more complex than just streamlining intermediaries and shortening distances in the

supply chain. Definitions highlight multiple attributes associated with relational and value proximity. Furthermore, it **shares several characteristics with phenomena observed in local food systems**.

### *3.2.2 Local food systems*

There is **no universal definition** of LFS, mainly because different interpretations of the "local" scale exist. In the political sphere, LFS are defined differently across the world (Enthoven and Van den Broeck, 2021), and even in the EU. Governments and civil society organizations have promoted local food systems as key drivers toward achieving more inclusive, resilient, and sustainable food systems, based on the perceived multitude of benefits they offer (Enthoven and Van den Broeck, 2021). Over the past decade, **governments worldwide have actively promoted LFSs**, driven by the belief in their perceived advantages. In 2020, the European Commission introduced the "Farm to Fork Strategy," which emphasizes the importance of bolstering the resilience of regional and local food systems. The strategy highlights the Commission's commitment to fostering LFSs and diminishing reliance on long-haul transportation to enhance the resilience of these systems (Wesseler, 2022). However, the term "local food system" is often used without a clear, universally accepted definition, leading to confusion and varied interpretations among stakeholders, which will be further elaborated in Chapter 4 (Problem statement). Local food systems are complex and multifaceted, with definitions that vary widely depending on geographic, economic, and social contexts. The emphasis on geographic closeness in the literature, sustainable practices, and community development is gaining ground as well, albeit the lack of a standardized definition poses challenges for policymaking and implementation.

While SFSCs have been explicitly defined in scientific, policy, and practical terms, LFSs remain more of a scientific and conceptual category. Although LFS definitions exist, there is no formally adopted one by governments, which contributes to the lack of a standardized interpretation across policy contexts.

### *3.2.3 Differences and overlaps between the SFSC and LFS concepts*

Conceptually, the two terms also differ in scope: while **SFSCs are framed primarily as value chains**, focusing on the length and governance of transactions between producers and consumers, **LFSs are framed as systems**, encompassing the broader set of actors, activities, and outcomes within a defined locality.

SFSCs and LFSs are both aiming at promoting sustainability, reducing intermediaries, and enhancing the connection between producers and consumers. However, they have some **different characteristics and overlaps**. SFSCs are mainly defined by the minimal number of intermediaries between production and consumption, focusing on direct sales or limited intermediaries (Jarzębowski et al., 2020; Kneafsey et al., 2013; Kawecka and Gębarowski, 2015), while **LFS is a broader concept**, containing all food systems within a specific locality, emphasizing local production, distribution, and consumption (Drejerska and Sobczak-Malitka, 2023; Gori and Castellini, 2023). Csíkné Mácsai (2014) states that these food systems, besides reflecting the physical distance, also reflect market accessibility and logistical feasibility. SFSCs are mostly emphasizing the shortening of the supply chain length, transparency, traceability, and direct interaction between food chain participants (Jarzębowski et al., 2020; Engelseth, 2016; Kneafsey et al., 2013), while LFSs usually emphasise that food is produced, processed, and consumed within a region, promotes local economic development and community resilience (Drejerska and Sobczak-Malitka, 2023; Gori and Castellini, 2023).

Both concepts promote sustainability, support local economies, reduce carbon footprints, and foster community engagement (Jarzębowski et al., 2020; Drejerska and Sobczak-Malitka, 2023; Kneafsey et al., 2013; Gori and Castellini, 2023), and highlight the importance of close relationships between consumers and producers, enhancing trust, transparency, and product quality (Jarzębowski et al., 2020; Engelseth, 2016; Kawecka and Gębarowski, 2015). They also share their challenges as well, like scalability, market adaptation, and the frequent need for supportive policies and infrastructure to be profitable (Drejerska and Sobczak-Malitka, 2023; Kneafsey et al., 2013).

**Since consumers often perceive SFSC and LFS products in a similar way, this dissertation refers to the two terms jointly, reflecting its focus on consumer perception.**

### *3.2.4 Benefits and criticism of the sustainability of LFSs and SFSCs*

From a consumer perspective, local food systems (LFSs) and short food supply chains (SFSCs) are often seen as the same. For analytical purposes, however, this distinction is crucial: SFSCs primarily refer to shortened links between producers and consumers, while LFSs encompass broader systemic aspects such as farming practices, packaging, public catering, and the preservation of local varieties.

Both have been widely discussed as possible responses to the challenges of globalized and industrialized food systems, including climate change, biodiversity loss, emerging diseases,

food-related illness outbreaks, and the erosion of rural cultural identities and traditional knowledge (Eriksen, 2013; Schönhart et al., 2009; Blake et al., 2010; Edwards-Jones, 2010; Kremer and DeLiberty, 2011). Importantly, **local production should not be equated with sustainability** per se; rather, it represents one **potential pathway** through which more sustainable practices may be realized.

As Born and Purcell (2006) note, the outcomes of LFSs and SFSCs are highly **context-dependent**, shaped by the actors, agendas, and institutional settings in which they operate. This variability was also confirmed by the SmartChain project (2021), which evaluated SFSCs across Europe from environmental, social, and economic perspectives. The project found that while SFSCs often perform strongly in social and economic terms—enhancing trust, fairness, and producer empowerment—their environmental performance is more variable, particularly due to consumer travel and fragmented logistics. Against this backdrop, the following discussion reviews the potential benefits and criticisms of LFSs and SFSCs, structured around the three pillars of sustainability: environmental, social, and economic.

#### *3.2.4.1 Environmental aspect*

When analysing the environmental implications of SFSCs and LFSs, it is important to recall their conceptual distinction discussed earlier. Because of these differences, certain environmental impacts may appear contradictory if both concepts are treated as identical. The following discussion therefore considers their environmental aspects in a complementary way.

Both SFSCs and LFSs are associated with potential environmental benefits, most notably **reductions in food miles and greenhouse gas emissions**. By involving fewer intermediaries and shorter transportation distances, these systems reduce energy consumption and often rely on locally sourced inputs and low-carbon delivery options (Jarzębowski et al., 2020; Hoang, 2021). **Compostable or recyclable packaging** (or **less packaging**) is also frequently employed, further decreasing environmental impact (Balcom et al., 2023; Hoang, 2021).

At the same time, the benefits of shorter producer-to-market distances may be offset by **consumer travel**. Life cycle assessment (LCA) studies consistently show that this is often the weakest environmental point of SFSCs: frequent individual trips can outweigh the advantages of reduced transport distances, particularly when consumers use private cars to access farm shops or markets (Kiss et al., 2019; Loiseau et al., 2020; Majewski et al., 2020; Mancini et al., 2019; Sala et al., 2017). Practice-based insights from the SmartChain project (2021) further highlight that without innovative logistical solutions,such as last-mile delivery coordination or

collective distribution models, the environmental advantages of SFSCs can be undermined, in particular by consumer mobility. Similarly, insufficient packaging may result in higher levels of **food waste** (Obersteiner et al., 2021).

A critical issue for SFSCs is the environmental efficiency of logistics. Transactions often involve small quantities delivered directly from producers to consumers, which can reduce transport **efficiency**, especially when both sides travel individually. This reflects the relational nature of SFSCs, where face-to-face interaction strengthens trust but may simultaneously increase environmental burdens.

By contrast, LFSs can integrate sustainability more broadly at the system level. They can encourage **sustainable land use practices**, such as organic farming, integrated pest management, regenerative agriculture, and no-till farming, which enhance soil health, reduce reliance on synthetic inputs, and contribute to healthier ecosystems (Balcom et al., 2023; Hoang, 2021). **Biodiversity preservation** is another advantage, as LFSs reconnect consumers with food production and promote the appreciation of local ecosystems (Ochoa et al., 2020). Supporting **multifunctional landscapes** through policies can balance food production with biodiversity conservation, reducing environmental pressure without compromising output (Rega et al., 2019).

Several studies confirm that small-scale farmers, who are often the backbone of short food supply chains, tend to be more **environmentally conscious** and adopt more sustainable practices than larger farms, due to diversified production systems and reliance on traditional knowledge (Ricciardi et al., 2021; Stępień et al., 2022). Environmental consciousness has also been found to positively influence the intention to adopt sustainable agricultural practices, suggesting that farmers engaged in local systems may indeed be motivated by ecological values (Bhujel and Joshi, 2023).

Resource efficiency can be more advanced in LFSs. Local systems can reduce the need for packaging and energy-intensive storage by relying on fresh and seasonal products. They can also facilitate **circular solutions**, such as enhancing nutrient cycles (e.g., phosphorus), which are difficult to implement in larger and more fragmented systems. Food waste can be minimised by reducing losses at different stages of the supply chain and by fostering consumer awareness of food's value, encouraging more mindful consumption (Hoang, 2021).

While LFSs and SFSCs can provide considerable environmental benefits, their impacts are not uniform and depend on the type and organisation of the system as well as regional conditions

(Kiss et al., 2019; Majewski et al., 2020; Vittersø et al., 2019). Local production does not automatically equate to the lowest carbon footprint, as broader factors—such as dietary choices and systemic efficiencies—also play a crucial role (Stein and Santini, 2022).

#### *3.2.4.2 Social aspect*

Social aspects often cut across both SFSCs and LFSs, as many of the benefits are linked to reconnecting producers and consumers. While most social impacts are shared, their emphasis differs: SFSCs are particularly associated with trust-building and relational ties, whereas LFSs more broadly foster inclusiveness, urban–rural linkages, and community engagement.

Through these systems, consumers gain access to fresh, seasonal goods directly from traceable producers, which strengthens **trust**—a vital component in creating sustainable food systems (Benson et al., 2020). Local markets and similar outlets **reconnect consumers with farming practices** and production processes. Well-established local food systems also enhance **social cohesion**: in disadvantaged rural areas they can counteract outmigration by providing opportunities, while in urban areas they reconnect populations with rurality and foster civic participation, for example through community gardens and small markets (Diekman, Gray and Thai, 2020).

These functions extend beyond everyday consumption. In times of crisis and instability, local food systems help to sustain trust between producers and consumers, while also addressing inequalities created by **urban–rural divides**. Economic dynamics reinforce these social effects, as SFSCs retain a significant portion of farm revenues within local economies, generating local multiplier effects through local hiring and reinvestment (Kłoczko-Gajewska et al., 2023; Filippini et al., 2023).

Localization, as a **resilience** concept, focuses on strengthening the capacity of municipalities and local actors to adapt and build community resilience (Granvik, 2017). While these systems may not guarantee food security or always reduce carbon footprints, their role in fostering **rural development** and community cohesion remains undeniable (Stein and Santini, 2022). Yet inclusiveness remains a challenge: local food products are often tailored to specific, wealthier, or more educated consumers, which can undermine equity. A more sustainable trajectory requires addressing the needs of all consumers, not just the privileged few, to ensure that local food contributes to an inclusive and fair food system (Allen et al., 2017; DuPuis and Goodman, 2005; Selfa and Qazi, 2005; Blake et al., 2010, p. 423).

#### *3.2.4.3 Economic aspect*

The economic role of short food supply chains and local food systems can be assessed at two levels: the individual farm (income, profitability, and turnover) and the broader local economy (multiplier effects, employment, and regional development).

At the farm level, participation in SFSCs allows producers to retain a **greater share of the product's market value** by reducing intermediaries, which can increase income and improve profitability. In France, by 2010, 21% of farms engaged in SFSCs, and for 40% of these farms, such sales accounted for more than 75% of turnover (Kneafsey et al., 2013). Evidence from seven European countries confirms that producers often capture higher margins in SFSCs compared to conventional chains (Malak-Rawlikowska et al., 2019). However, results remain context-dependent: meta-analytical evidence shows that while some farmers report higher satisfaction and income, others experience no significant difference relative to longer chains (Chiaverina et al., 2023).

Across the EU, about 15% of farms sell more than half of their production directly to consumers, though the distribution is uneven: less than 5% in Malta, Austria, and Spain, compared to 21% in France, and nearly 50% among farms specialized in vegetables and honey (EPRS, 2016). Despite this, **direct sales** still account for only around 2% of the EU fresh food market, underlining both the marginal role and the growth potential of SFSCs (EPRS, 2016). Structurally, small farms (<5 hectares) dominate European agriculture, making up 63.8% of all farms. Moreover, 86.1% of the agricultural workforce consists of family labour, highlighting the socio-economic embeddedness of SFSCs in a landscape where personal relations and trust are central (Eurostat, 2020a; Eurostat, 2020b).

Beyond individual farms, SFSCs and LFSs generate broader economic benefits. **Local multiplier studies** show that they strengthen regional economies by keeping money circulating locally. For example, a UK organic box scheme demonstrated that every £1 spent generated £2.59 in the local economy, compared to £1.40 in supermarkets (Kneafsey et al., 2013). More recent evaluations confirm that multiplier effects (LM3) regularly exceed 2 in cases from France, Hungary, Italy, Poland, and the UK (Kłoczko-Gajewska et al., 2023). Beyond direct revenues, **employment creation** is another dimension: in Oklahoma, farmers' markets generated 113 full-time equivalent jobs, while in France direct sales accounted for 26.1% of agricultural employment in 2005 (Kneafsey et al., 2013). These examples illustrate how local

food initiatives can retain revenue and employment within communities, strengthening peripheral and disadvantaged regions.

The scale and form of these benefits, however, vary considerably by region, product type, and organisational model. In France, only 11% of wine producers in Languedoc-Roussillon used SFSCs, compared to 67% in Central France (Kneafsey et al., 2013). Northern and Western Europe generally show more diversified SFSCs, while in Southern and Central-Eastern Europe schemes remain smaller and less diversified (Kneafsey et al., 2013). Case studies demonstrate that SFSCs can add value for small farms in Slovakia (Floriš et al., 2022) and stabilise incomes in Vietnam (Bui et al., 2021), though limited production scale is a barrier in Poland (Drejerska and Sobczak-Malitka, 2023). Beyond agriculture, strong local food systems also interact positively with **tourism** by reinforcing cultural identity and gastronomic heritage, thereby providing indirect economic value.

The economic role of SFSCs and LFSs operates across farms and regions: participation can improve margins, create employment, and stimulate rural development, yet outcomes remain uneven and highly context-dependent (Vittersø et al., 2019; Stein and Santini, 2022). While some farmers benefit from local markets, others find greater profitability in international ones (Stein and Santini, 2022). The evidence summarised in Table 3 demonstrates that SFSCs and LFSs contribute to sustainability through multiple pathways. Still, their environmental, social, and economic impacts are not uniform, and limitations such as low market share, uneven profitability, and logistical trade-offs remain significant. These mixed outcomes highlight the importance of conceptual clarity when analysing local food systems and set the stage for the next section, which examines the broader concept of local food.

*Table 3 Summary - benefits and criticisms of local food systems and short food supply chains across the three pillars of sustainability*

| | BENEFITS | CRITICISMS |
|---|---|---|
| **ENVIRONMENTAL** | • Reduced food miles and lower GHG emissions due to shorter transport distances (Jarzębowski et al., 2020; Hoang, 2021)<br>• Use of compostable, recyclable or minimal packaging (Balcom et al., 2023; Hoang, 2021)<br>• Encouragement of sustainable farming practices (organic, regenerative, integrated pest management)<br>• Promoting biodiversity and multifunctional landscapes (Balcom et al., 2023; Ochoa et al., 2020; Rega et al., 2019)<br>• Small-scale farmers in SFSCs often more environmentally conscious, relying on diversified and traditional practices (Ricciardi et al., 2021; Stępień et al., 2022)<br>• Improved resource efficiency and circular nutrient flows, e.g. phosphorus (Hoang, 2021)<br>• Reduction of food waste and support for mindful consumption (Hoang, 2021) | • Environmental benefits highly context-dependent, vary by region and supply chain type (Vittersø et al., 2019; Kiss et al., 2019; Majewski et al., 2020)<br>• Consumer travel to access local food may offset sustainability gains (Loiseau et al., 2020)<br>• LCA studies show consumer travel is often the weakest environmental point of SFSCs (Majewski et al., 2020; Mancini et al., 2019; Sala et al., 2017); SmartChain (2021) confirms need for innovative logistics<br>• Local food does not always have a lower carbon footprint compared to efficient global systems (Stein and Santini, 2022)<br>• SFSC logistics (small deliveries, face-to-face exchanges) may increase emissions |
| **SOCIAL** | • Builds consumer trust and transparency (Benson et al., 2020)<br>• Enhances food literacy and reconnection with food production processes (Diekman, Gray and Thai, 2020)<br>• Provides access to healthy food, including for low-income groups (Diekman, Gray and Thai, 2020)<br>• Supports local cohesion, rural livelihoods and urban-rural linkages (Kłoczko-Gajewska et al., 2023; Filippini et al., 2023)<br>• Fosters civic participation and social capital (Granvik, 2017) | • Does not guarantee full food security or significant carbon reductions (Stein and Santini, 2022)<br>• Often targets privileged consumer groups, excluding less affluent populations (Allen et al., 2017; DuPuis and Goodman, 2005; Selfa and Qazi, 2005; Blake et al., 2010)<br>• Conceptual ambiguity: consumers often unaware of distinction between SFSCs and LFSs |
| **ECONOMIC** | • Increases farmer income through direct sales and improved price retention (Augère-Granier, 2016; Malak-Rawlikowska et al., 2019)<br>• Significant role in farm turnover in some cases (e.g. 21% of French farms in SFSCs; 40% of them >75% of turnover) (Kneafsey et al., 2013)<br>• 15% of EU farms sell more than half their output directly; yet direct sales only 2% of EU fresh food market (EPRS, 2016)<br>• Small farms dominate EU agriculture: 63.8% of farms <5 ha; family labour provides 86.1% of workforce (Eurostat, 2020a; 2020b)<br>• Strengthens local economies through job creation and multiplier effects (Filippini et al., 2023; Kłoczko-Gajewska et al., 2023)<br>• Supports cultural identity and rural tourism (World Wide Fund for Nature, 2007)<br>• Opportunities for marginalized groups in the context of Industry 4.0 transitions (Manyika et al., 2017) | • Market share remains low despite potential (EPRS, 2016)<br>• Economic outcomes uneven: some producers benefit more from export markets (Stein and Santini, 2022)<br>• Regional and structural differences influence viability (Vittersø et al., 2019; Doenberg et al., 2022; Malak-Rawlikowska et al., 2019)<br>• Employment and income effects vary and remain context-dependent (Chiaverina et al., 2023) |

Source: *Self-edited table*

## 3.3 The local food concept

### *3.3.1 Definitions of local food*

There is increasing interest among various stakeholders in supporting local food, making it crucial to understand consumer preferences associated with it (Hasanzade et al., 2022). However, the concept of "local" remains inconsistent and lacks a universally accepted definition (Blake et al., 2010; Dunne et al., 2011; Hinrichs, 2003; Pearson et al., 2011, as cited in Chicoine et al., 2022). A more precise conceptualisation would provide not only economic (Pearson et al., 2011) but also environmental (Duram and Oberholtzer, 2010) and social benefits (Renting et al., 2003, as cited in Chicoine et al., 2022). Although primarily spatial, definitions of local food are increasingly framed in relational or qualitative terms (Ostrom, 2006, as cited in Chicoine et al., 2022).

According to Fernández-Ferrín et al. (2017), local product definitions generally rely on three main criteria: geographical proximity between production and consumption; policy and administrative borders; and relational proximity expressed through novel supply chains and social networks. While these criteria are frequently referenced, value proximity—referring to product characteristics and identity—is gaining significance. Schmitt et al. (2018) identified several factors for determining "localness," including distance, supply chain size, intermediary involvement, percentage of direct sales, local expertise, product identity tied to a region, and governance structures. The degree of "localness" varies depending on how these criteria interact.

The literature provides a wide range of definitions, from strictly spatial viewpoints (measured in miles or kilometres) and policy boundaries to more holistic approaches that integrate emotional and ethical dimensions, such as personal relationships with producers or the community (Feldmann and Hamm, 2015). While some definitions emphasise geographical constraints, others prioritise relational trust and social connections over distance alone (Bosona and Gebresenbet, 2011; Kneafsey et al., 2013).

**Attributions of local food**

Beyond academic and policy definitions, local food also carries meanings attributed by consumers. Studies consistently distinguish between **private benefits**, such as health, taste, and enjoyment, and **public benefits**, such as ethical, environmental, and altruistic considerations (Merle et al., 2016; Fernández-Ferrín et al., 2017; Edwards-Jones et al., 2008; Bond et al., 2008). In practice, these motivations are often intertwined: consumers value both the direct,

personal advantages of local food and its wider social and environmental contributions. Building on this literature, the following analysis organises consumer attributions of local food into three interrelated categories: **systematic benefits, consumer trust, and cultural and regional identity.**

**Consumer trust**

**Transparency** in production processes significantly influences consumer preferences (Fernández-Ferrín et al., 2019). Consumers value clear and reliable information on how food is grown, processed, and distributed (Hinrichs, 2000). In this context, direct producer–consumer interactions in short food supply chains foster greater trust (Eriksen, 2013; Martinez, 2010). Consumers also increasingly expect local food to **align with their ethical values**, including fair labour practices and sustainable agricultural methods (Dowd and Burke, 2013). In addition, supporting local farmers directly reinforces trust, as many consumers believe that purchasing local food contributes to economic resilience and community well-being (Szente et al., 2014; Memery et al., 2015; Fernández-Ferrín et al., 2019). This trend was also confirmed in Hungary during the COVID-19 pandemic (Garai-Fodor, Popovics and Csiszárik-Kocsir, 2022).

In our previous study, consumer trust in local food systems was measured through a representative survey in Hungary (László et al., 2024). Using Benson's trust toolkit adapted for local food systems, we examined relationships between locality and trust. The findings revealed significant correlations among different levels of food-related trust, such as interpersonal trust, local person trust, general organisational trust, local farmer trust, and local food trust. Higher interpersonal trust was associated with increased food-related trust, while demographic factors like region, education, or income showed no significant impact.

These results suggest that consumer trust must be actively built by local food producers. Large-scale producers tend to rely on high-volume contracts, while small-scale producers depend more heavily on shared values and community trust to remain competitive despite pricing limitations and limited advertising capacity (László et al., 2024).

**Region and culture-specific attributes**

Local food is often associated with regional **heritage**, as certain areas specialise in particular products due to climatic conditions, the availability of raw materials, or traditional knowledge (Van Ittersum et al., 2003). Fernández-Ferrín et al. (2019) and Fischer and Zeugner-Roth (2017) distinguish between *cognitive country-of-origin effects*, which influence consumer product

preferences, and *normative consumer ethnocentrism*. Usunier and Cestre (2007) argue that consumers tend to associate products from their own country with greater familiarity and trust.

The TRUEFOOD project (n.d.) defines traditional products as those consumed during specific **celebrations or seasons**, passed down through generations, and rooted in regional heritage (Vanhonacker et al., 2010, as cited in Fernández-Ferrín et al., 2019). Guerrero et al. (2009) further showed that European consumers link **traditional** products with qualities such as simplicity, natural processing, and purity.

**Systematic benefits**

The short distance between production and consumption is one of the most researched aspects of local food definitions. Concise distance-based definitions (e.g., within a specific radius or driving hours) are the most common in scientific literature, along with those based on administrative boundaries such as counties or states (Feldmann and Hamm, 2015; Meyerding et al., 2019). Chambers et al. (2007) found that UK consumers perceive local products as fresher, of higher quality, and superior in taste due to the **reduced transportation distance**. Similarly, Edwards-Jones et al. (2008) identified proximity as a primary motivation for acquiring local products. The concept of "food miles" and its environmental implications has further strengthened this aspect of consumer decision-making (Smith and MacKinnon, 2009).

Definitions of local food systems often emphasise their favourable characteristics. Enthoven and Van den Broeck (2021) identified claims regarding the benefits of LFS, such as improving consumers' **access** to healthy food and providing economic benefits to farmers. Additionally, participation in LFS strengthens social ties and **stimulates local economies**. LFS are often linked to environmentally friendly production practices, contributing to sustainability and reducing the overall environmental impact (Enthoven and Van den Broeck, 2021).

Taken together, these systematic benefits illustrate why distance and logistics remain important in both academic and consumer conceptualisations of local food. While geographical proximity is a dominant criterion, relational trust, sustainability, and cultural significance also play essential roles. Consumer motivations range from personal benefits such as taste and freshness to ethical concerns such as sustainability and supporting local producers. The distinction between local and domestic food remains ambiguous, further complicating efforts to standardise the definition.

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Moving forward, it is essential to integrate these perspectives into both policy frameworks and academic research to support the continued development of local food markets. The lack of a unified definition and the confusion in the literature pose several challenges and potential negative implications, which are further discussed in Chapter 4 (Problem statement).

*Table 4 Summary table about the local food concepts*

| | Key Points | Geographic proximity | Relational proximity | Value proximity | References |
|---|---|---|---|---|---|
| **Systematic benefits** | LFS reduce transport needs, improve food quality, support sustainability, and strengthen local economies. While SFSCs minimize intermediaries, not all are local. LFS also enhance environmental performance. | Short distances, fewer food miles | Fewer intermediaries, stronger ties, community benefits | Local identity | Feldmann and Hamm, 2015; Chambers et al., 2007; Smith and MacKinnon, 2009; Enthoven and Van den Broeck, 2021 |
| **Consumer trust** | Trust arises through transparency and direct contact. Local food must reflect consumer values. Small-scale producers depend on interpersonal and community trust more than large-scale ones. | Visibility of origin, local production | Direct producer-consumer interactions, interpersonal trust | Shared values, ethical alignment | Hinrichs, 2000; Eriksen, 2013; Fernández-Ferrín et al., 2019; László et al., 2024 |
| **Cultural and regional identity** | Local food is rooted in regional heritage, tradition, and identity. Consumer preference is shaped by familiarity, symbolic meaning, and authenticity. | Region-specific products and resources | Cultural ties, local expertise | Tradition, authenticity, product symbolism | Van Ittersum et al., 2003; Fischer and Zeugner-Roth, 2017; Guerrero et al., 2009; Usunier and Cestre, 2007 |

Source: *Self-edited table*

While the concept of local food is often described through its benefits and perceived attributes, these are closely tied to how proximity is experienced by consumers. As shown, locality is not solely defined by geographical distance, but also by social ties, shared values, and emotional resonance. To better understand these interconnected elements, the next chapter explores proximity theories, which offer a structured framework for interpreting how consumers construct the meaning of “local” in relation to food.

## 3.4 Proximity

The term "proximity" might seem straightforward at first, as the immediate association often relates to geographic distance. However, the more we delve into the literature on proximity theories, the more complex the concept becomes. Even when considering its most basic definition from Oxford Dictionaries, it is described as "nearness in space, time, or relationship" (quoted by Eriksen, 2013). Proximity is a complex concept encompassing various dimensions beyond mere physical distance, as the geographic distance represents only a fraction of the broader idea of proximity. A vast body of literature explores different models of proximity, and in this chapter, I will focus on those concepts that contribute to a deeper understanding of food locality and consumer perceptions.

I have chosen to examine the local food phenomenon through different dimensions of proximity because the perception of locality extends far beyond the simple notion of distance between production and consumption. Stakeholders perceive local food products based on their priorities, concerns, abilities, goals, and unique values (Chicoine et al., 2022). Various theoretical approaches conceptualize local food through different proximity dimensions. According to Eriksen (2013), the concept of proximity provides a useful framework for understanding the diverse interpretations of local food products. Proximity can be analysed in relation to living beings (e.g., a consumer), places, or objects (e.g., a food product) (Torre, 2010). Further exploration of the literature on food proximity reveals several distinct perspectives.

Various scholarly approaches define local food in terms of different proximity dimensions. I categorised these theoretical frameworks based on how many types of proximity they incorporate as dual, triple, or multiple proximity approaches. However, before delving into these classifications, it is important to first introduce Construal Level Theory, a broader psychological framework that provides foundational insight into how perceived distance (across spatial, temporal, social, or hypothetical dimensions) influences consumer perceptions and decisions regarding local food.

### *3.4.1 Construal level theory*

In consumer psychology, perceived proximities are often explained by the construal level theory (CLT). CLT is a psychological framework that explains how psychological distance influences individuals' mental representations. The theory suggests that as psychological distance increases, any type of distance, may it be temporal, spatial, social, or hypothetical, the way individuals construe these stimuli shifts from concrete, detailed representations (low-level construal) to more abstract, generalized representations (high-level construal) (Trope and Liberman, 2003; Trope et al., 2007).

Importantly, high-level and low-level construals are not merely reactions to external distance but represent fundamental **modes of cognitive processing**. High-level construal involves abstract thinking about how the world should be - focusing on ideals, values, and long-term goals that are often temporally, spatially, and socially distant. In contrast, low-level construal represents concrete thinking about immediate practicalities in the here and now, emphasizing feasibility, specific features, and immediate constraints (Trope and Liberman, 2010).

This cognitive distinction has profound implications for understanding consumer behaviour, particularly in contexts where abstract values should translate into concrete purchase decisions. Psychological distance can be understood through several dimensions: *temporal, spatial, social, and hypothetical* in Trope and Liberman's model (2003). **Temporal** distance refers to the perceived time until an event happens; **spatial** distance is the physical space between the individual and the event; **social** distance relates to the perceived closeness to others involved; and **hypothetical** distance is the likelihood of an event happening (Trope et al., 2007; Wiesenfeld et al., 2017). Research indicates that increased psychological distance leads to higher-level construals, characterised by abstract thinking rather than specific details (Trope and Liberman, 2003; Trope et al., 2007), having implications for decision-making processes.

Individuals may rely on high-level construals when evaluating distant events, which can lead to different judgments and behaviours compared to evaluations of near events. For example, when considering a future purchase, consumers may focus on the overall values associated with the product (high-level construal) rather than the immediate costs or features (low-level construal) (Bae, 2020; Yao et al., 2021). This shift in focus can influence consumer preferences and intentions, as evidenced by studies showing that abstract descriptions can enhance the desirability of products when psychological distance is high (Yao et al., 2021).

**The construal mismatch in sustainable consumption**

This cognitive distinction creates a fundamental construal mismatch in sustainable consumption contexts. **Sustainability concerns inherently involve high-level construal thinking** - they address abstract, long-term, globally distant environmental and social goals such as climate change mitigation, biodiversity preservation, and intergenerational equality. However, **actual purchase decisions occur in low-level construal contexts**, where consumers focus on immediate practicalities such as price, convenience, availability, and sensory clues like taste, and tangible product features. This mismatch could partly explain the **attitude-behaviour gap** in sustainable consumption, where consumers express positive attitudes toward sustainable products but fail to translate these into actual purchases. When shopping, the abstract benefits may feel psychologically distant compared to the concrete considerations of price, perceived quality, or convenience. The high-level construal motivations that drive sustainability attitudes become less salient when consumers engage in the low-level construal process, e.c. purchase.

CLT suggests that the effectiveness of persuasive messages can vary based on the construal level of the audience. High-level construals often resonate more with individuals who are psychologically distant from the subject matter, while low-level construals may be more effective for those who are closer (Bae, 2020). This has significant implications for marketing strategies, where the **framing of messages can be tailored** to align with the psychological distance of the target audience (Bae, 2020).

**Local food as a bridge between construal levels**

How can marketers reduce psychological distance to **bridge the gap between abstract sustainability goals and concrete purchase behaviour**? This might be one of the most challenging aspects of sustainable marketing. Given the attitude-behaviour gap in sustainable consumption, researchers and practitioners have focused on identifying strategies that can effectively **connect high-level sustainability motivations with low-level purchase behaviours**. I believe, local food could present an opportunity to bridge this construal gap.

Most sustainable solutions face the challenge of remaining psychologically distant from consumers' immediate experiences, **being difficult to translate abstract environmental values into concrete purchase decisions**, as detailed before. Local food, however, may offer a different dynamic, by reducing multiple dimensions of distance simultaneously. When consumers can visualize the nearby farm, know the farmer's name, or taste the typical flavour,

(with the right strategy) **abstract concepts of environmental stewardship become connected to concrete experiences**.

Modern consumers have become **increasingly disconnected from agricultural production and food systems**, with most having little direct experience or knowledge of how their food is grown or produced. Local food systems can help bridge this experiential gap by facilitating direct contact with producers, making food production processes more psychologically proximate and concrete. According to CLT, this increased psychological closeness should enhance consumers' willingness to take **concrete actions**, as abstract sustainability goals become connected to tangible relationships and experiences (at least, based on the theory).

The possibility for local food to reduce psychological distance extends beyond mere geographic proximity, offering multiple pathways to reduce psychological closeness and possibly activate low-level construal benefits. These include sensory experiences, like freshness, typical flavours or special recipes (heritage). The shorter supply chain could also mean consumers can access products at peak ripeness and quality, creating tangible rewards for their (possibly) sustainable choice. Local food also provides social benefits that activate low-level construal processing. Consumers can develop **personal relationships** with farmers at markets; this social proximity transforms abstract concepts like "supporting local economy" into concrete experiences of helping specific families. The ability to ask questions directly, learn about farming practices firsthand, and receive **personalized** recommendations creates a level of **engagement and trust** that distant, anonymous food systems cannot match.

I believe local food systems could make abstract sustainability values feel immediate and personal, while providing concrete benefits that justify the purchase decision on the practical grounds.

CLT provides a foundational framework for understanding how types of perceived distance affect perceptions and decisions. The theory's strength lies in explaining why consumers may simultaneously hold positive attitudes toward sustainability while struggling with actual purchase decisions – a phenomenon that simple attitude–behaviour models cannot adequately address.

In my dissertation, this is why perceived proximities play a central role: first, I emphasise the analytical separation of different perceived proximities instead of treating distance as a monolithic construct; and second, I argue that **examining consumer behaviour through these distinct but interconnected proximities addresses a missed opportunity in the literature**.

Previous research has tended to oversimplify perceived distance in the context of local food, whereas a multidimensional proximity perspective can offer a more precise and practically relevant understanding. Building on this basis, we now turn to more tangible approaches that have been directly applied to the concept of local food, making it easier to interpret and implement in real-world scenarios.

### *3.4.2 Proximity theories applied to food context*

This sub-chapter reviews how proximity theories have been applied to the local food context. It introduces dual, triple, and multiple proximity approaches, outlining their main dimensions and insights, and sets the ground for selecting the most suitable framework for this research.

#### *Dual proximity studies*

Dual proximity approaches are the simplest theoretical frameworks (if we do not consider those approaches, which only understand local food based on a single distance, geography). Hasanzade et al. (2022) examine the multidimensional nature of local food in terms of geographical and social proximity. They argue that for local food, geographical proximity is the most frequently used criterion, referring to the distance between food production and the place of food purchasing (Feldmann and Hamm, 2015; Fernández-Ferrín et al., 2018). Alongside geographical proximity, social proximity also plays a crucial role in shaping consumer perceptions and choices (Denver et al., 2019; Fernández-Ferrín et al., 2018; Jensen et al., 2019). Torre and Rallet (2005) differentiate between geographical and organized proximity. Geographical proximity expresses the physical distance separating two locations, while organized proximity refers to the ability of an organization to foster interaction among its members, incorporating a logic of belonging and similarity.

#### *Triple proximity studies*

Triple proximity approaches are among the most common in the literature. Nagy-Pető et al. (2023) identify **geographical, social, and environmental** proximity. Social proximity in their framework includes direct sales, small farm size, environmentally conscious production, and organic farming. Environmental proximity refers to the reduced environmental burden of transport and storage, making local food more sustainable (Benedek and Balázs, 2014). Tregear (2007) categorizes local food systems based on proximity and typicity, resulting in three types: **direct produce** (sold without special territorial links), **close typicity** (products with strong cultural and territorial connections), and **distant specialty** (like close typicity but with weaker consumer-producer ties). Torre (2010) suggests that proximity can be analysed in terms of

relationships between **living beings, places, or objects**, that can be easily to the **relational, geographical, and value** proximity approach, suggested by Eriksen (2013).

***Multiply proximity studies***

While dual and triple proximity frameworks are the most common in the literature, they may not fully capture the complexity of how locality is perceived. In recent years, scholars have proposed more elaborate models that identify a greater number of proximity dimensions. These *multiple proximity* approaches reflect the idea that local food can be interpreted through a variety of interconnected aspects—beyond just geography, social ties, or values—such as institutional, cultural, or technological proximity.

Boschma, (2005) listed five forms of proximity, namely geographic, organizational, cognitive, social and institutional proximity. However, this study was not inclusively examined food related proximities, rather concentrated on the learning and innovation aspects. Chicoine (*et al.*, 2022) investigated which dimensions of proximity can be used to define the concept of proximity, and collected from the literature nine types of proximity, naming geographical, access, functional, process, price, identity, relational, cultural and technological proximity.

*Table 5 Summary table of main proximity theories*

| ***Theory*** | ***Main insight*** | ***Proximity dimensions*** | |
|---|---|---|---|
| ***Construal Level Theory (CLT)*** | Psychological distance shapes mental construal and consumer decision-making. | Psychological (temporal, spatial, social, hypothetical) | Trope and Liberman (2003, 2007) |
| ***Dual proximity dimensions*** | Local food is shaped by geographical and social proximity; spatial distance and social interaction. | Geographical, Social/Organizational | Hasanzade et al. (2022); Torre and Rallet (2005) |
| ***Triple proximity dimensions*** | Three dimensions: geographical, relational/social, and value/environmental are commonly used to define local food. | Geographical, Relational/Social, Value/Environmental; Cultural, Geographical, Relational | Eriksen (2013); Tregear (2007) |
| ***Multiple proximity dimensions*** | Expanded proximity framework with up to 9 types; integrates cultural, identity, and technological dimensions. | Geographical, Cognitive, Institutional, Cultural, Identity, Technological, etc. | Boschma (2005); Chicoine et al. (2022) |

Source: *Self-edited table*

Although the topic of proximity has been extensively explored at a theoretical level, a clear gap remains in terms of empirical testing. Among the various conceptual approaches, I selected Eriksen's approach because it is **well-established in the literature**, while also being sufficiently **clear and adaptable** to support further theoretical refinement and empirical

investigation. In contrast, other approaches, like dual or multiple proximity models, are either too limited in scope or conceptually fragmented; and many of them are based on similar underlying ideas, which are **already well captured** by Eriksen's model (e.g. Torre, 2010), making it a theoretically integrative choice in the literature. Triple proximity models have become the dominant framework in literature , and Eriksen's taxonomy offers a balanced yet comprehensive foundation that avoids unnecessary complexity while still accommodating essential dimensions such as innovation, trust, and cultural embeddedness.

### *3.4.3 Eriksen's three domains of proximity*

Eriksen, (2013), examined how researchers within the local food systems literature define local food, as they believed these can be used as a starting point to identify a new taxonomy of local food based on three domains of proximity. According to the three domains of proximity approach, local food systems are generally related to three domains of proximity: **geographical proximity, relational proximity** (e.g. relationship between actors) and **value proximity** (product related characteristics) (Eriksen, 2013).

*Table 6 Eriksen's three domains of proximity*

| | **Domains of proximity** |
|---|---|
| **Geographical** | The explicit spatial/geographical locality, (e.g. area, community, place or geographical boundary) distance and/or radius (e.g. food miles), within which food is produced, retailed, consumed and/or distributed. |
| **Relational** | The direct relations between local actors (e.g. such as producers, distributors, retailers and consumers) reconnected through alternative production and distribution practices such as farmers markets, farm shops, cooperatives, box schemes, food networks, etc. |
| **Value** | The different values (e.g. place of origin, traceability, authentic, freshness, quality, etc.) that different actors attribute to local food. |

Source: *Self-edited table based on (Eriksen, 2013 page 51)*

**Geographical proximity**

The connection between food and place remains a strong conceptual foundation (Eriksen, 2013), therefore should be discussed in detail. In academic literature, local food is typically described based on the physical distance between production and consumption, as well as political or administrative boundaries. Various authorities and associations have attempted to define local food by establishing geographical distances or borders, such as counties or states, which are frequently referenced in research (Fernández-Ferrín et al., 2017). Geographical proximity, in the context of food, can be understood as a specific territorial distance, locality, or radius. However, it is crucial to recognize that geographical proximity is only one dimension of local food.

Political and administrative boundaries play a significant role in shaping consumer perceptions of local food, as demonstrated by a case study of the Brantford Farmers' Market in Ontario, Canada (Feagan and Morris, 2009). The study shows how consumers often interpret "local" not in terms of kilometres, but by whether products fall within familiar political-administrative boundaries, such as a county or municipality. This highlights the symbolic weight of boundaries in shaping perceived locality. Nevertheless, definitions of local food extend beyond spatial considerations. Consumers also evaluate who produces the food, how it is cultivated, and how it is distributed and sold within the supply chain (Hinrichs, 2000). Specifically, there is an expectation that local food should be provided through alternative food networks or direct marketing channels (Eriksen, 2013; Martinez et al., 2010).

**Confusion regarding geographical proximity**

Two primary areas of confusion emerge in the literature regarding geographical proximity:

1. **The nature of distance:** Futamura (2007) highlights that the term "local" does not clarify whether it refers to the distance from raw material production, food processing, or final sale. Bosona and Gebresenbet (2011) define local food as products that are produced, retailed, and consumed within a designated area. Morris and Buller (2003) further distinguish between two types of local food: products produced and sold within a specific region and products that, despite being regionally produced, are intended for export as value-added goods. The latter category introduces the concept of *value proximity*, extending beyond mere geographical considerations.
2. **The size of the distance:** The geographical distance used to define local food varies significantly. Pearson et al. (2011) note that local food is often equated with food miles, though specific thresholds vary. Rose et al. (2008) define local food as being produced within 100 miles of the consumer's residence; an approach also used by Smith and MacKinnon (2009). However, Blake et al. (2010) argue that distances such as 30, 50, or 100 miles are arbitrary, and that local food should be understood within smaller geographical units. Prior research has examined a wide range of distances, from 30 km to nearly 650 km, when determining what qualifies as local food (de-Magistris and Gracia, 2016; Meas et al., 2015; Meyerding et al., 2019; Willis et al., 2016, cited by Hasanzade et al., 2022).

**In my view, geographical proximity is less about absolute distance and more about practical accessibility.** Rather than focusing solely on kilometres or miles, factors such as

administrative boundaries, road networks, transportation options, and perceived regional cohesion play a more important role in how consumers interpret locality. This **shifts the emphasis from objective spatial measures to subjective and context-dependent** understandings. While the literature presents a wide range of definitions and thresholds, I do not commit to a single interpretation; instead, I highlight the diversity of approaches and the resulting conceptual ambiguity. Eriksen (2013) similarly argues that local food is primarily defined in terms of geographical proximity (often in combination with relational and, less frequently, value-based proximity) yet a comprehensive understanding of local food cannot rely solely on geography (Dunne et al., 2011; Futamura, 2007).

**Relational proximity**

Relational proximity plays a crucial role in shaping consumer perceptions and behaviours in local food systems. The definition of "local" can also refer to the distance between the producer and the consumer (Fekete, 2009). Unlike geographical proximity, relational proximity emphasizes the social and emotional connections between consumers and food producers. This concept aligns with consumer preferences for trust, and direct interaction in food supply chains. According to Hand and Martinez (2010), consumers seeking local products are not merely concerned with where products are produced but also with how they are made and who is responsible for their production. Consumers often prefer **personal interaction** with producers, aiming to **minimize the social distance** between production and consumption rather than just the geographical one. Similarly, Bond et al. (2008) found that consumers purchasing food in agricultural markets particularly value social interaction with producers, reinforcing the importance of relationship-building in food systems.

Relational proximity is closely linked to social proximity, which refers to the **distance in relationships** among local actors, including producers, distributors, retailers, and consumers. Galli and Brunori (2013) further argue that social proximity can be measured by the number of intermediaries in the food supply chain, with local food systems typically minimizing intermediaries to ensure a more direct connection between producers and consumers. This reduction in intermediaries fosters greater **trust**, transparency, and a sense of **community**.

A key characteristic of relational proximity is the establishment of transparent food chains, where products reach consumers with a significant degree of information about their origin and production methods (Renting et al., 2003). Providing information on a product's origin, quality attributes, and ethical production methods helps consumers develop a stronger sense of

connection with the region and its producers (Fernández-Ferrín et al., 2017; Marsden et al., 2000; Renting et al., 2003). The reliability of this information plays a vital role in fostering consumer trust and loyalty.

Recent research by Zhong (2023) expands the understanding of local food by categorizing consumer perspectives into three groups: place-based native food, culture-based hometown food, and value-based ecological food. The study suggests that localness is also conferred through relational proximity via visceral experience (deep, instinctive, and emotional reaction), cultural heritage, and value identity. This theoretical approach shows the importance of emotional and cultural connections between consumers, producers, and food production regions.

**In my interpretation, relational proximity is a complex category of closeness that is fundamentally based on interpersonal relations within the value chain.** It reflects the perceived social and emotional distance between actors, most commonly between consumers and producers, but it can also extend to other stakeholders. I may feel close to a producer I have spoken with or met personally, while I might feel more distant from someone I share a common culture with but have never interacted with. At the far end of the spectrum, someone living on the other side of the world, with whom I share neither language nor cultural background, would represent a high degree of relational distance. Therefore, **in my opinion relational proximity captures not only the presence of interaction, but also the quality of perceived human connection embedded in local food systems.** Such connections are often associated with the social dimension of sustainability, as they foster trust, fairness, and community cohesion. Yet their contribution is not automatic, since access to these networks can be uneven, making inclusivity and transparency decisive conditions for turning relational proximity into a socially sustainable practice.

**Value proximity**

Value proximity refers to the set of values that different actors attribute to local food, shaping consumer preferences and purchasing decisions. Eriksen (2013) describes value proximity as encompassing key attributes such as place of origin, traceability, authenticity, freshness, and quality. In addition to these tangible factors, Delind (2006) highlights the importance of qualitative aspects such as trust, pride, mutuality, and respect, which contribute to the overall perception of local food.

An extensive literature review by Feldmann and Hamm (2015) shows the prevalence of product characteristics in defining local food perceptions. Among the most frequently mentioned attributes are better **quality** and **taste** (Adams and Adams, 2011; Bingen et al., 2011; Bond et al., 2008; Campbell et al., 2013; Conner et al., 2010; Cranfield et al., 2012; Dunne et al., 2011; Grebitus et al., 2013; Naspetti and Bodini, 2008; Onozaka and McFadden, 2011; Weatherell et al., 2003; Yue and Tong, 2009; Zepeda and Deal, 2009). Perceived superior quality is frequently associated with **freshness**, **healthiness**, and **wholesomeness** (Loureiro and Hine, 2002; Naspetti and Bodini, 2008; Onozaka and McFadden, 2011; Wawrzyniak et al., 2005). Bond et al. (2008) also note that consumers purchasing food in agricultural markets highly value freshness and superior quality, reinforcing the significance of product characteristics in shaping consumer choices. Consumers increasingly prioritize the environmental and social sustainability of food production methods. Hand and Martinez (2010) found that consumers express support for small farms and agricultural practices that emphasize **sustainability** and animal welfare., consumer trust in local food products plays a crucial role in purchasing behaviour. Local food is often perceived as safer and more traceable, fostering a sense of **reliability** and confidence among consumers (Burchardi et al., 2005; Darby et al., 2008; Nganje et al., 2011; Yue and Tong, 2009). The acceptance of novel food products, similarly, depend on perceived naturalness and alignment with consumer values (such as sustainability, familiarity, and transparency) (Fischer and Hilboesen, 2025). According to Autio et al. (2013), Finnish consumers often associate local food with self-produced or foraged items, which they regard as the most authentic forms of local food. This perception reflects deeper values such as frugality, craftsmanship, and a longing for the past, what the authors term agrarian nostalgia.

These findings underline that value proximity is not only rational but also rooted in memory, identity and emotional resonance. Value proximity encapsulates both tangible and intangible aspects that contribute to consumer perceptions of local food. In this research, value proximity primarily refers to product-related attributes, including freshness, quality, healthiness, and region-specific characteristics. It also encompasses innovative product features such as sustainable and traditional packaging, which enhance consumer perceptions of local food.

**In my interpretation, value proximity refers to the perceived closeness between the consumer's own set of values and the values they associate with a food product.** These values can include **sensory aspects** such as freshness or quality, but also **broader, more abstract assumed values** like ethical or cultural dimensions, authenticity, fairness, or sustainability. What matters here is not necessarily whether these attributes are objectively

present, but whether the consumer assumes the product embodies them. In this sense, value proximity is not a characteristic of the product itself, **but a reflection of the extent to which the consumer feels that the product resonates with what they personally find important**. It is a subjective, interpretive dimension of closeness, grounded in identity, beliefs, and emotional associations. When values such as fairness, authenticity, or responsibility are at stake, value proximity becomes directly linked to the social dimension of sustainability by connecting individual choices to collective ethical concerns. However, if dominant values remain primarily hedonic, its potential contribution to sustainability may be limited.

### 3.5 Consumer perception theory

Consumer perception refers to the cognitive process through which individuals receive, interpret, and organize stimuli to form mental representations of products and contexts (Becker et al., 2019). In marketing and consumer behaviour, perception is central because it shapes how consumers evaluate attributes, form attitudes, and decide (often under uncertainty) what to buy. For local food, this matters insofar as perceptions map onto three proximity dimensions. Perception is inherently selective and interpretive, filtered by prior experience, knowledge, and context (Agyekum et al., 2015). Even when attributes are objectively measurable, consumers' evaluations remain subjective (Kotler et al., 1999). This **subjectivity** is most visible in unfamiliar or credence-heavy categories, where acceptance hinges on perceived naturalness, familiarity, and trust (Fischer and Hilboesen, 2025), all of which anchor value proximity (e.g., freshness, authenticity) and are often authenticated through relational proximity (person-to-person assurances).

Two motivational orientation further structure perception. **Hedonic** evaluation emphasises immediate sensory enjoyment; **eudaimonic** evaluation foregrounds longer-term, identity-congruent values (Veres, 2024). Local food frequently sits at their intersection**:** taste and freshness (hedonic) co-exist with ethical, cultural, or place-based meanings (eudaimonic). Consumer perception also spans **functional vs. symbolic** appraisals (Veres, 2024). Functional appraisals target justifiable attributes (quality, performance, convenience), symbolic appraisals attach social and personal meaning (identity expression, belonging, stewardship). This duality explains why symbolic meanings can override less favourable functional terms (e.g., price), sustaining preference for "local."

Beyond the individual, perception is socially embedded. Antonides and Van Raaij (1998) distinguish **objective reality** (taste), **represented reality** (labels, packaging, origin cues), **social experiences** (peer norms, community narratives), and **subjective perception**

(internalised beliefs that integrate all three). For local food, these layers clarify why "localness" is co-produced by product signals, place framings, and relationships.

These perspectives show that consumer perception is not a neutral recording of product attributes but a **selective and meaning-laden process**. This matters for my research because it explains why locality is experienced differently across consumers, for example: value proximity captures how product cues are read as signals of authenticity or responsibility, relational proximity reflects how trust and social ties authenticate those signals, and geographic proximity frames how place and distance are interpreted. Building on this theoretical foundation, the following section turns to the empirical literature on local food perception, illustrating how these general mechanisms manifest in diverse cultural and regional settings.

**Consumer perception of local food in literature**

Consumers see local food in diverse ways, influenced by personal values, cultural norms, and information availability (Granvik, 2017). Mount (2012) highlights that different actors along the food supply chain perceive local food differently, leading to varied interpretations. While policymakers, producers, and retailers define local food based on logistical and regulatory factors, consumers often associate it with **freshness, ethical considerations, and regional identity** (Blake et al., 2010; Eriksen, 2013).

Consumer attitudes toward local food are shaped by their level of knowledge and contextual influences (Feldmann and Hamm, 2015). Additionally, demographic factors and habitual attitudes impact purchasing decisions (Zepeda and Deal, 2009). Understanding these motivations is essential for engaging consumers in local food systems.

**European consumers** often associate local food with environmental sustainability, reduced carbon footprints, and higher quality standards (Chambers et al., 2007; Augère-Granier, 2016). However, perceptions and priorities vary across regions and consumer groups. In Northern and Western Europe, local food is frequently linked to environmental and animal welfare concerns, and certification labels play a stronger role in signalling trust and sustainability Rejman et al., 2023). In Central and Eastern Europe, consumers tend to be more price-sensitive, yet they increasingly value quality and food safety; here local food is often framed through rural traditions, cultural heritage, and support for local producers (Szegedyné Fricz et al., 2020; Horská et al., 2018). In Southern Europe, terroir and traditional production methods remain central, with strong emphasis on authenticity, regional identity, and typical flavours (Baselice et al., 2017; Almli et al., 2011). Comparative projects such as Smartchain further highlight these

differences, showing that while consumers across Europe generally express positive attitudes toward local food, actual purchasing is constrained by issues of availability, convenience, and inconsistent definitions of what counts as "local" (Smartchain, 2021).

Several studies have explored consumer opinions on local food in Hungary. Szegedyné et al. (2020) identified three key factors influencing consumer perception and purchasing decisions. Hungarian consumers generally attribute **positive characteristics** to local food, such as superior taste, naturalness, and environmental friendliness. Local food is often linked to **specific geographical regions** and traditional flavours. The main motivations for purchasing local food include **experiencing local flavours (68.2%) and supporting local employment (63.5%)**. Kovács et al. (2022) focused on young consumers, identifying four main motivational drivers: **hedonism, curiosity, nutritional value, and tradition**. The most influential factors were **taste and curiosity**, suggesting that younger generations approach local food both for pleasure and exploration. Meanwhile, Szente et al. (2014) found that **72.9% of Hungarian consumers consider local food important**, with **70.1% preferring to purchase from dedicated local food stores**. These studies highlight that Hungarian consumers value local food primarily for **quality and safety**. However, while Szegedyné et al. (2020) emphasized consumer awareness, Kovács et al. (2022) focused on youth motivations, and Szente et al. (2014) examined consumer preferences for regional products. These variations suggest that **different demographic groups prioritize different aspects of local food**, underscoring the need for targeted marketing strategies and policy interventions.

In my previous research on the social representation of sustainable food consumption (László, 2022), the most frequently mentioned terms were **health** (f = 75), **organic** (f = 62), and local producer (f = 47). The findings indicate that Hungarian consumers associate local food with **sustainability**, viewing it as a means to support responsible consumption. This suggests that in Hungary, local food plays an essential role in fostering sustainable consumer behaviour. In this study, I take a different approach by integrating consumer perception factors into three proximity dimensions: value, relational, and geographic. Within this framework, sensory aspects such as freshness or taste are discussed in relation to value proximity, as they often serve as signals of quality or authenticity, while external influences are more closely connected to relational and geographic proximity. Rather than attempting to capture all possible consumer interactions with local food, the analysis concentrates on **expected attributes and their interpretation**, acknowledging that a full exploration of consumer perception would require tracking interactions in specific settings, which lies beyond the scope of this study.

These findings demonstrate the complexity and multidimensionality of local food perception, shaped by psychological, cultural, and contextual factors. However, despite the extensive literature, existing approaches tend to be fragmented and lack systematic integration when linking consumer perceptions with proximity dimensions. This gap highlights the need for a conceptual framework that connects theoretical insights with measurable attributes. The following Chapter 4. Problem statement presents the core problem this research seeks to address, setting the stage for the model development and empirical investigation.

# 4 Problem statement

The concept of local food has gained increasing attention in both academic and practical debates, yet its meaning remains fragmented and contested, and its historical evolution also warrants recognition. This interpretative ambiguity creates challenges at three levels: academic research, practical implementation, and policymaking. Further issues also emerge in relation to consumers, innovation, ethics, and sustainability.

**Academic consequences**

In the academic literature, local food is conceptualised through diverse lenses. Some studies focus primarily on geographical closeness, while others emphasise economic, cultural, or social ties, reflecting an evolution in how local food has been understood over time (Eriksen, 2013; Meyerding et al., 2019). This divergence creates comparability problems: results are often context-dependent, making generalisation difficult (Selfa and Qazi, 2005). Systematic reviews confirm that researchers employ a wide variety of criteria, resulting in a fragmented knowledge base (Enthoven and Van Den Broeck, 2021; Bazzani and Canavari, 2017). The lack of academic coherence weakens the consistency and applicability of results (Cappelli et al., 2022; Lang et al., 2014). Although there is growing consensus that multiple proximity dimensions are relevant (Eriksen, 2013; Chicoine et al., 2022; László and Wahlen, 2024), studies rarely integrate them systematically within a single framework. Even where such integrative frameworks exist, they are seldom empirically tested, a gap this dissertation directly addresses.

**Practical consequences**

The interpretative ambiguity of "local" also generates challenges for market actors. Different stakeholders (including producers, retailers, consumers, and policymakers) prioritise different aspects (Tregear, 2011; Dunne et al., 2011). For small-scale producers, branding and trust-building are particularly difficult in the absence of clear labelling rules and amid diverse consumer expectations (Feldmann and Hamm, 2015; Ahearn et al., 2018; Khan and Prior, 2010). Consumers themselves are heterogeneous: some value organic attributes, others prioritise price–quality ratio or freshness, while yet others emphasise locality, requiring segmented marketing strategies (Jensen et al., 2019; Hristov et al., 2023). Inconsistent definitions undermine trust, weaken brand identity, and reduce the effectiveness of communication campaigns (Banerjee and Quinn, 2022; Jensen et al., 2019; Feldmann and

Hamm, 2015). In urban contexts, barriers such as price sensitivity, limited availability, and scepticism about the meaning of "local" further constrain demand (Khan and Prior, 2010; Penney and Prior, 2014). Relational proximity can reinforce loyalty among frequent buyers but is insufficient on its own to ensure regular purchasing (Bond et al., 2008). Segmenting consumers based on which type of proximity matters most is therefore essential, since different groups emphasise different drivers (Jensen et al., 2019; Denver et al., 2019; Memery et al., 2015). Moreover, actors often rely on their own interpretation of "local," rather than considering how other stakeholders perceive the term, for example, producers and policymakers should adopt consumer perspectives when designing communication strategies.

**Policymaking and development**

Unclear definitions also hinder effective policy design. Regulatory uncertainty prevents consistent interventions (Dunne et al., 2011; Pearson et al., 2011). Reductionist approaches, such as focusing only on "food miles," oversimplify the issue by neglecting social, cultural, and economic dimensions (Coley et al., 2009; Chambers et al., 2007; Edwards-Jones et al., 2008). Consumer perceptions are rarely incorporated into policymaking, leaving interventions poorly grounded (Hu et al., 2010; Weatherell et al., 2003). International comparability is further limited by the absence of harmonised definitions and databases (Enthoven and Van Den Broeck, 2021; Braaten and Coit, 2010). This results in missed opportunities: without integrating consumer attitudes and behaviours, policies fail to realise the full community and economic potential of local food systems (Cvijanović et al., 2020; Carfora and Catellani, 2023). At the EU level, instruments such as CAP measures for short food supply chains or geographical indications (PDO/PGI/TSG) still rely heavily on geographic criteria, even though consumers interpret "local" in more complex ways. This narrowness also undermines EU-wide initiatives such as the Farm to Fork strategy, which risk reducing local food to distance alone while underestimating relational and value-based meanings. More flexible frameworks are therefore needed to acknowledge multiple proximity dimensions as legitimate consumer concerns.

**Additional considerations**

Beyond academia, practice, and policy, further challenges arise. From a consumer perspective, the inconsistent meaning of "local" can create a trust crisis in labelling (Weatherell et al., 2003). Ambiguity also hinders innovation, slowing the adoption of digital short supply chain platforms and new logistics solutions. Ethical and sustainability dimensions are frequently overlooked: a

purely geographical definition may ignore labour conditions, animal welfare, or environmental impacts, and can even be misused for greenwashing. Communication and education are weakened because programmes and campaigns promote divergent narratives of what "local" means. Health and sustainability discourses often diverge: consumers tend to choose local food primarily for health, taste, and quality reasons, rather than automatically linking it to environmental or social benefits (Annunziata and Mariani, 2017; Van Bussel et al., 2022; Kovács et al., 2022). Distinguishing types of proximity is therefore crucial, because different consumer groups prioritise different dimensions. Relational proximity fosters trust, which can sometimes outweigh geographical closeness in shaping purchase intention.

The definitional ambiguity of local food generates academic, practical, and policy challenges. It fragments the research base, undermines consumer trust, complicates marketing and brand-building, and limits the coherence of policymaking. This dissertation argues that a proximity-based approach enables a more nuanced segmentation of consumers, avoiding the oversimplifications that arise when local food is reduced to distance alone. By empirically validating this multidimensional framework, it demonstrates how research, market practice, and policy interventions can be more effectively aligned.

*Table 7 Problem–approach matrix*

| Problem area and specific challenges | How the dissertation addresses them |
|---|---|
| **Academic research**<br>• Divergent definitions, comparability problems.<br>• Fragmented knowledge base due to varied criteria.<br>• Lack of coherent frameworks; when they exist, seldom empirically tested. | Develops and empirically tests a multidimensional proximity framework (geographic, relational, value). Uses EFA and CFA to establish reliability, validity, and integrative potential. Provides a measurement model to unify fragmented conceptualisations. |
| **Practical implementation**<br>• Stakeholders interpret "local" differently.<br>• Marketing and branding face difficulties; inconsistencies undermine trust.<br>• Consumer heterogeneity complicates segmentation. | Analyses how perceptions vary across demographic groups (age, gender, income). Identifies which proximity dimensions most strongly influence consumer preferences. Offers a framework for segmentation and targeted strategies. |
| **Policymaking and development**<br>• Regulatory uncertainty due to unclear definitions.<br>• Reductionist "food miles" approaches ignore cultural and social dimensions.<br>• Consumer perspectives rarely integrated; lack of harmonization hinders comparability. | Examines the differentiated role of proximity dimensions in willingness to pay and purchase frequency. Provides empirical grounding for policies to move beyond geography and incorporate relational and value-based concerns. |
| **Additional considerations**<br>• Inconsistent meanings create labelling trust crisis.<br>• Ambiguity hinders innovation<br>• Ethical and sustainability aspects often overlooked; risk of greenwashing.<br>• Diverging narratives: health/taste/quality vs. sustainability. | Clarifies how consumers connect (or fail to connect) local food with sustainability, ethics, and health. Distinguishes roles of proximity types in shaping trust, communication, and education. Contributes to clearer narratives and innovation pathways. |

Source: *Self-edited table*

# 5 Empirical research

This chapter presents the empirical foundation of the dissertation. It begins by outlining the research design, then details the exploratory research phase and the development of a theoretical model, followed by the construction and validation of the consumer questionnaire. The chapter concludes with a description of the representative consumer survey conducted in Hungary, including sampling strategy, data cleaning procedures, and an overview of the statistical methods applied.

## 5.1 Research aim, conceptualisation, operationalisation, and triangulation

### Aim and topic of the research

The overarching objective of my research is to develop and empirically validate a multidimensional **framework for understanding how consumers perceive local food**, with a focus on geographic-, value-, and relational proximity. By constructing and testing a **dedicated measurement scale**, the study seeks to provide deeper insights into the structure of consumer perceptions and the **factors that influence willingness to pay and purchase frequency**. This contributes to a more precise conceptualisation of "local food" in the context of consumer behaviour and supports the development of more targeted strategies for innovation.

### Development of a new theoretical framework

A novel theoretical framework has been developed to advance the comprehension of consumer perception of local food. This approach seeks to clarify the social construction of local food perception by examining its relationship with different types of proximity, inspired by Eriksen (2013).

The foundation of this concept was established through three interrelated processes. First, an extensive **literature review** was conducted to identify the key characteristics typically associated with local food. Second, these insights were enriched by **exploratory research** and **real-life experiences** such as participatory research camps and farmer shadowing, which offered direct exposure to how local food is embedded in everyday practices. Third, the identified characteristics were systematically organized based on their underlying features and their associations with proximity dimensions, resulting in a structured matrix framework.

Following the theoretical development, the **empirical test** began with transforming the identified characteristics into measurable survey items. These items formed the basis of a dedicated **scale** designed to capture consumer perceptions of local food. The scale underwent a

rigorous **validation** process, including expert review and psychometric testing. A nationwide survey was then conducted among Hungarian consumers, using a **representative sample** to ensure the generalizability of findings within Hungary, while acknowledging contextual limitations.

This research contributes to the academic discourse in several important ways. It introduces a new conceptualization of consumer perception of local food, grounded in the **multi-dimensional proximity framework**. It also results in the development of a **validated questionnaire instrument** that can be used to empirically assess these perceptions. Furthermore, the **nationally representative data** offer valuable insights into how Hungarian consumers understand and relate to the idea of local food.

### Conceptualisation

The conceptualisation phase of this research aimed to define the core constructs related to consumer perception of local food. Drawing upon an extensive literature review, the study identified that consumers perceive "locality" not only in geographical terms but also through social relationships and value-based attributes. Based on this insight, the concept of local food was structured along three interrelated proximity dimensions:

- Geographic proximity – the physical distance between production and consumption
- Relational proximity – the social ties between producers and consumers
- Value proximity – the alignment of product characteristics with consumer values.

This conceptual framework is grounded in Eriksen's (2013) three domains of proximity, a widely applied model in local food research, and is further supported by construal level theory (Trope and Liberman, 2003), which explains how psychological distance influences consumer perceptions. These theoretical foundations are discussed in detail in the 3. Literature review chapter, particularly in the sub-sections titled 3.4 Proximity, and 3.5 Consumer perception theory chapters.

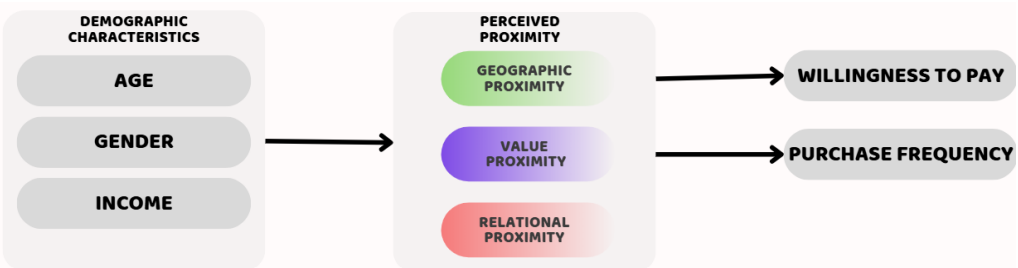


*Figure 2 Conceptual framework*

*Source: Self-edited figure*

**Operationalisation**

Following the conceptual clarification of proximity dimensions, the research proceeded to operationalise these constructs for empirical investigation. The goal was to **translate the abstract proximity concepts into measurable variables** that could capture consumers' perceptions. For this, a dedicated survey instrument was developed. Each proximity type was represented through a set of Likert-scale items, designed to reflect both theoretical insights and findings from preliminary qualitative research. The item development process involved multiple stages, including expert review, pilot testing, and psychometric validation. The operationalisation process is detailed in Chapter 5.5 Consumer questionnaire development chapter. Exploratory and confirmatory factor analyses (EFA and CFA) were used to validate the underlying structure of the measurement model. Furthermore, reliability and validity were tested and presented in the Appendix 1.

**Topic of the research**

This is a consumer research study with the **spatial delimitation set for Hungary**, and the target group comprises Hungarian **consumers**, ensuring a representative distribution of age groups and gender. To enhance the credibility of the findings and mitigate potential research biases, triangulation is applied in multiple ways within this doctoral dissertation research.

**Triangulation**

**Methodological triangulation** is achieved through a mixed-method approach, incorporating both qualitative (free association games, interviews, observations) and quantitative (consumer questionnaire techniques. This combination allows for a more comprehensive understanding of the research topic.

**Data triangulation** is addressed by constructing a representative sample that includes all genders and generations. The sample is further enriched by involving small farmers and experts, ensuring diverse perspectives in the data collection process.

**Theoretical triangulation** is ensured through the application of several existing models and theories, including Social Representation Theory, Proximity Theories, and Consumer Perception Theories. These frameworks provide a robust theoretical foundation for interpreting the findings and offer multiple lenses through which to analyse the data.

*Table 8 Summary of the key elements of the research*

| *Element* | *Description* |
|---|---|
| ***Research aim*** | To develop and empirically validate a multidimensional framework for understanding consumer perceptions of local food, focusing on geographic, relational, and value proximity. |
| ***Key constructs*** | Geographic proximity, relational proximity, value proximity |
| ***Conceptualisation*** | Based on literature review, participatory field experiences (e.g. research camps, producer shadowing), and qualitative exploratory research. Constructs were structured into a proximity-based framework. |
| ***Operationalisation*** | Each proximity dimension was translated into Likert-scale items based on qualitative results and theoretical foundations. The scale underwent expert review, pilot testing, exploratory (EFA) and confirmatory factor analysis (CFA), and reliability/validity checks. |
| ***Survey instrument*** | Consumer perception of local food scale, developed and validated in this research. |
| ***Sampling strategy*** | Nationwide Hungarian sample, representative in terms of age group and gender. Contextual relevance was ensured by focusing on Hungarian consumers. |
| ***Data collection methods*** | Mixed methods: qualitative (free association, interviews, producer observation) and quantitative (questionnaire survey) |
| ***Theoretical frameworks*** | Proximity theory (Eriksen, 2013), Construal Level Theory (Trope and Liberman, 2003), Social Representation Theory (Moscovici, 1961) |
| ***Analytical methods*** | Exploratory and confirmatory factor analysis, latent variable construction, regression models (linear and quantile), parametric and non-parametric tests |
| ***Triangulation*** | Applied at methodological (mixed methods), data (multi-actor perspectives, representative sample), and theoretical levels (multiple frameworks) |

Source: *Self-edited table*

The following table provides an overview of the hypotheses formulated in this study, along with a summary of their theoretical background, as supported by existing academic literature. This synthesis highlights the conceptual foundations that guided the empirical analysis.

## 5.2 Hypothesis and theoretical justification

*Table 9 Theoretical justification of the proposed hypotheses*

| *Hypothesis* | *Theoretical justification* |
|---|---|
| ***RQ2: What types of proximity influence Hungarian consumers' perception of local food?***<br>*H2.1: Hungarian consumers perceive local food through multiple proximity dimensions, including relational and value proximity alongside geographic proximity.* | Eriksen (2013) introduced the three-domain proximity framework (geographic, relational, value) to describe consumer perceptions of local food systems. Fernández-Ferrín et al. (2017) confirmed that these dimensions shape how consumers interpret localness. Chicoine et al. (2022) expanded the framework by identifying nine forms of proximity, including the three key dimensions. Tregear (2007) and Marsden et al. (2000) emphasized the importance of cultural and social embeddedness in local food systems. Boschma (2005) supported the multidimensionality of proximity in economic geography. |
| ***RQ3: How do demographic characteristics influence Hungarian consumers' perceived proximity of local food?***<br>*H3.1: Consumers' perception of local food varies across different age groups.* | Autio et al. (2013) found that older consumers value tradition and self-sufficiency, while younger consumers are motivated by ethics and sustainability. Fernández-Ferrín et al. (2019) demonstrated age-based differences in local food motivations. Wawrzyniak et al. (2005) and Loureiro and Hine (2002) revealed generational variation in perceptions of food quality and risk. Veres (2024) linked generational cohorts to hedonic versus eudaimonic motivations. |
| *H3.2: Consumers' perception of local food differs between genders.* | Fischer and Hilboesen (2025) found that women are more responsive to sustainability and ethical food cues. Fernández-Ferrín et al. (2017) observed stronger emotional and symbolic interpretation of local food among women. Bond et al. (2008) and Onozaka and McFadden (2011) confirmed gender-based differences in health and relational attributes. Grebitus et al. (2013) reported greater female preference for freshness and eco-friendly products. |
| *H3.3: Consumers' perception of local food varies based on income levels.* | Hasanzade et al. (2022) reported that income influences accessibility and perceived value of local food. Burchardi et al. (2005) linked socio-economic background to trust and quality perception. Duram and Oberholtzer (2010) and Pearson et al. (2011) noted that higher-income consumers more frequently purchase local food for different reasons. |
| ***RQ4: How does the perception of local food relate to consumers' willingness to pay and purchase frequency?***<br>*H4.1: Value proximity, relational proximity, and geographic proximity have an effect on consumers' willingness to pay for local food.* | Feldmann and Hamm (2015) found that proximity improves perceived product quality and trust, increasing willingness to pay. Fernández-Ferrín et al. (2019) demonstrated that emotional and ethical closeness influence consumer WTP. Darby et al. (2008) showed that traceability (linked to relational proximity) enhances WTP. Zepeda and Deal (2009), Yue and Tong (2009), and Campbell et al. (2013) emphasized that values and place-based trust raise WTP. |
| *H4.2: Value proximity, relational proximity, and geographic proximity have an effect on consumers' purchase frequency of local food.* | Schmitt et al. (2018) defined proximity-related indicators predictive of local food behaviours. Fischer and Hilboesen (2025) identified value alignment as influencing purchasing decisions. Naspetti and Bodini (2008) and Weatherell et al. (2003) supported value-driven segmentation in food consumption, linked to frequency of purchase. |

Source: *Self-edited table*

## 5.3 Exploratory research

To understand local food phenomena in real-life contexts, I engaged in extensive fieldwork during my PhD studies, immersing myself in local food environments and interacting with key stakeholders. This included participating in research camps, visiting markets, and engaging directly with consumers and small-scale producers. My primary research areas were the Hungarian Balaton Uplands and Southern Hungary, complemented by international perspectives from Germany (Hessen), Finland (Lapland), and Spain (Andalusia). These diverse experiences, coupled with insights from scientific literature, highlighted the deeply culture- and region-specific nature of local food and the complexity of consumer perceptions.

### The social representation of local food

Given the complexity, I adopted a qualitative exploratory approach to gain a more profound understanding of Hungarian consumers' understanding of local food. The methodological framework was grounded in social representation theory (Moscovici, 1961), which provides a lens for examining how individuals and groups construct shared meanings. Social representations are shared beliefs, values, and meanings that emerge through communication and help individuals and groups make sense of complex social phenomena (Moscovici, 1961). Specifically, I employed a self-designed free association game (László, 2022) to investigate social representations of local food among Hungarian Generation Z consumers[2]. This method allows researchers to capture implicit cognitive structures by analysing associations made by participants in response to a stimulus word. Generation Z was selected because they represent an emerging consumer group whose food-related attitudes and practices are still being formed. Their perceptions are likely to influence the future of local food markets, yet empirical evidence on their understanding of local food in Hungary is scarce.

Between January and March 2023, 103 Hungarian Gen Z participants played the association game, generating five evoked words each (n = 515) in response to the stimulus "local food." Participants ranked their associations in terms of importance and assigned a polarity. The collected responses were analysed within the framework of three proximity dimensions: geographical, relational, and value based. The detailed study can be found in the article László and Wahlen, 2024. Free association games are well-established qualitative methods frequently used to explore implicit cognitive structures and social representations. These techniques reveal

[2] Please find the metadata for the exploratory research: László, V. (2024). Consumer associations of local food [Data set]. Zenodo. https://doi.org/10.5281/zenodo.12731046

spontaneous associations that provide insights into subconscious and culturally embedded perceptions without requiring participants to explicitly define anything. For the research, I developed a three-step self-designed free association game that builds upon the established word-listing technique while incorporating evaluative and hierarchical components. The core of the method is rooted in the established free association approach, while the polarity and ranking steps represent my own methodological extension.

- Step 1: Association generation

Participants were presented with the stimulus phrase "local food" and instructed to write down the first five words or phrases that came to mind. This initial step follows the standard free association protocol, designed to capture immediate, unfiltered cognitive responses before conscious filtering or elaboration occurs.

- Step 2: Polarity assessment

Following the association generation, participants were asked to assign a polarity rating to each of their five associations, categorizing them as positive, neutral, or negative. This evaluative component transforms the basic word list into affective data, revealing not only what participants associate with local food but how they emotionally evaluate these associations.

- Step 3: Importance ranking

In the final step, participants ranked their five associations in order of perceived importance from 1 (most important) to 5 (least important). This ranking creates a hierarchical structure that indicates which associations are most salient and central to participants' conceptualization of local food.

Upon completion of the three-step association task, participants provided demographic information including age, gender, and place of residence. This demographic data enables analysis of how associations, polarities, and importance rankings vary across different population segments.

To analyse the collected data, we applied indexes from sociology and the **Central core theory** (Abric, 1976), which helps distinguish between stable and peripheral elements of social representations. This theory suggests that representations are structured around a central core and a peripheral system. The central core consists of stable, deeply embedded elements that are shared by most participants. These elements define the representation and are resistant to change. The first periphery includes frequently mentioned elements that are less critical to the

core meaning but still significant. The contrast zone contains elements that are important to some subgroups but not to the entire population, and the second periphery comprises weakly shared, unstable associations that may change over time In this analytical approach, frequency indicates how many participants mentioned each association, while importance derives from participants' 1–5 rankings (lower scores = higher importance). Thus, the distinction between core and periphery is analytical, based on the frequency–importance matrix, and not the result of participants further elaborating on their associations.

To identify the central core, we constructed a frequency–importance matrix in which associations with both high frequency (above the sample mean) and high importance (i.e. low average rank score) were categorized as core elements. This method allows for a standardized and replicable way of distinguishing between the most stable and peripheral elements of a social representation.

*Table 10 The importance frequency matrix*

| | ***High importance*** | ***Low importance*** |
|---|---|---|
| ***High frequency*** | **Central core** | **First periphery** |
| | High frequency and high importance | High frequency and low importance |
| ***Low frequency*** | **Contrast zone** | **Second periphery** |
| | Low frequency and high importance | Low frequency and low importance |

Source: *Laszlo and Wahlen, 2024 page 3*

The central core is determined by associations with high frequency and high importance (above-average f and below-average OI). Elements that meet these criteria are considered fundamental to consumers' conceptualization of local food.

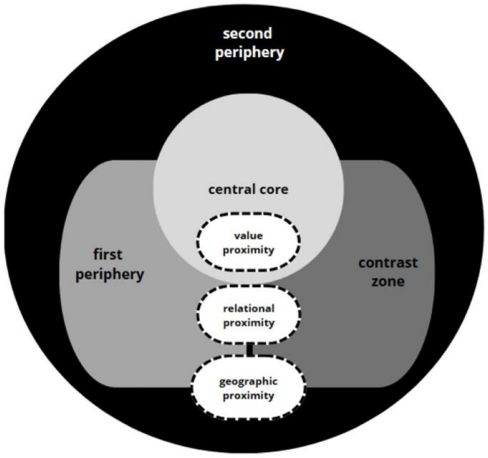


*Figure 3 The place of the different domains of food proximity on the representational field*

Source: *Laszlo and Wahlen, 2024 page 7*

Our findings challenge the traditional assumption that geographical proximity is the primary factor in consumer's local food understanding. Instead, **relational and value-based proximity emerged as dominant elements in the consumer representations**. Participants associated local food with attributes such as trust, freshness, taste, and quality, showing the importance of interpersonal connections and intrinsic product characteristics over mere physical distance. While the literature frequently emphasizes spatial factors in defining local food, our study found that **geographical proximity plays only a marginal role** in the social representations of Hungarian Gen Z consumers. Terms such as "local" and "Hungarian" appeared in the first periphery, rather than at the core of associations. This finding aligns with Nagy-Peto et al. (2023), who reported that Hungarian consumers exhibit diverse expectations regarding the geographic distance of food production. It also raises the question of whether consumers distinguish between local and national food products. Prior studies suggest that consumers often conflate these categories, perceiving food produced within national borders as "local" (Eriksen, 2013; Schönhart et al., 2009).

Relational proximity emerged as a key factor in how Gen Z consumers conceptualize local food. This proximity dimension emphasizes the role of direct relationships between consumers, producers, and food vendors. The inclusion of "trustworthy" in the central core highlights the significance of trust in local food systems. As Benson et al. (2020) argue, trust is foundational to consumer engagement in food markets. Our findings suggest that consumers value transparency, direct interaction with producers, and the perceived authenticity of local food. Strategies such as farmers' markets, community-supported agriculture (CSA) programs, and direct sales initiatives can capitalize on these relational dynamics.

Value-based proximity (encompassing product attributes such as healthy, freshness, and quality) was the most prominent element in consumer representations. The core of local food perception among Hungarian Gen Z consumers revolves around these intrinsic characteristics rather than geographical distance. This aligns with prior studies indicating that European consumers associate local food with superior quality, nutritional benefits, and authenticity (Augère-Granier, 2016; Kovács et al., 2022). Interestingly, while "organic" food ("bio") was frequently mentioned, it was not considered a defining feature of local food, reinforcing findings from Szente et al. (2014) that suggest Hungarian consumers do not strongly link organic certification with local food. The most unexpected finding was the strong association between local food and cost. "Expensive" was the second most frequently mentioned word and was predominantly assigned a negative polarity. This suggests that affordability is a key barrier

for young consumers in accessing local food, raising concerns about inclusivity and economic accessibility.

These insights offer both opportunities and challenges for food industry stakeholders. Marketing and product development strategies should prioritize relational and value-based aspects over purely geographic branding. Emphasizing health benefits, superior taste, and transparent production processes can enhance consumer engagement. Additionally, addressing cost concerns through innovative pricing strategies or value communication may help increase young consumers' willingness to pay for local food.

Our study (Laszlo and Wahlen, 2024) suggests investigation into consumer distinctions (or lack thereof) between local and domestic food. As consumer perceptions evolve, traditional definitions of local food based solely on geographic criteria must be reconsidered. Based on these exploratory findings, I have designed the quantitative research approach for the dissertation, which aims to further examine the nuances of local food perception and the role of proximity dimensions in shaping consumer attitudes.

## 5.4 Theoretical framework development

The initial theoretical model was constructed through an integrative process that combined insights from the literature review with findings from exploratory research. The first step involved **identifying key attributes** associated with local food and establishing a logical framework for their classification. These attributes encompassed various items (such as healthiness, ethnocentrism, support for local farmers, seasonality, and so on). The **categorization** of these attributes was initially guided by Eriksen's proximity theory, which provided a structured approach to organizing them. However, as the grouping process progressed, an alternative classification logic became evident. The attributes and related consumer perceptions naturally clustered into three distinct categories: (1) systematic benefits stemming from the alternative food chain, (2) region- or culture-specific attributes, and (3) consumer trust-related factors. This realization led to the formulation of the preliminary theoretical model.

To validate and refine the model, a focus group was conducted on November 14, 2023, involving six German doctoral students specializing in food-related topics. This group was selected to complement the continuous input received from Hungarian experts, offering a culturally proximate yet distinct perspective. Their academic background ensured informed and critical feedback, while their external viewpoint contributed to refining the model's clarity and broader relevance. Based on their insights, new items were incorporated, and structural modifications were made to better align the model with empirical observations. The final iteration of the theoretical model was completed following further refinement through expert discussions at academic conferences.

The theoretical model categorizes local food attributes based on Eriksen's proximity theory, which distinguishes between three key dimensions: value proximity, relational proximity, and geographic proximity. Each of these dimensions is further linked (through a second grouping method) to consumer trust, region/culture-specific attributes, and systematic benefits and innovation, described below. However, in the thesis we do not split further the 3 proximities.

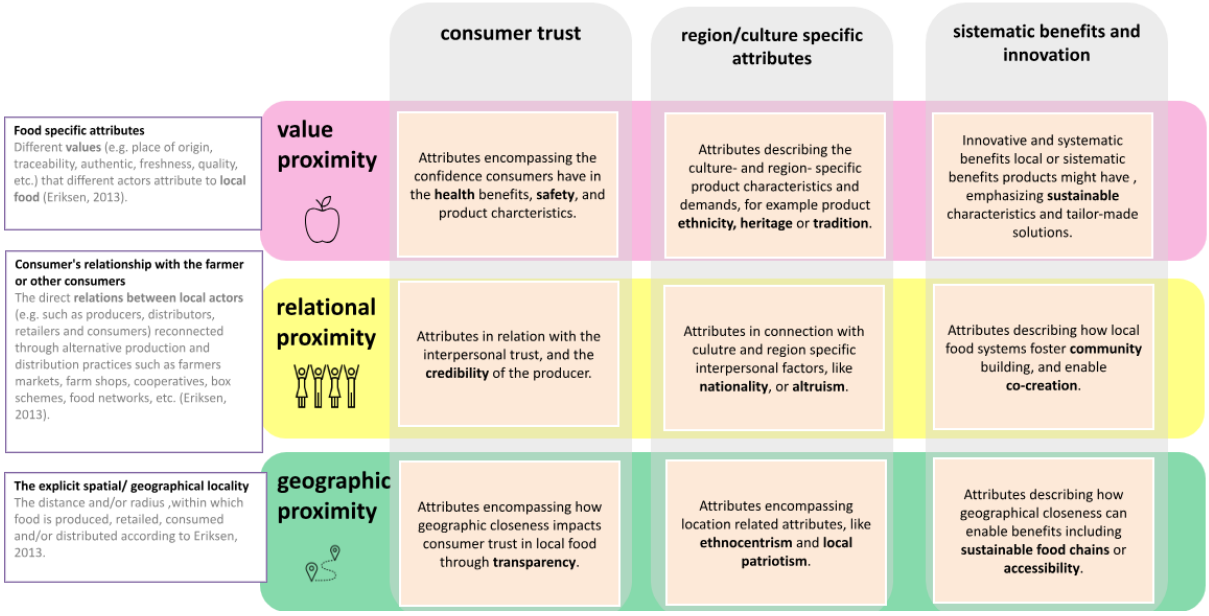


*Figure 4 The new theoretical concept for the consumer perception of local food*

*Source: Self-edited figure*

**Value proximity** refers to the perceived alignment between consumer values and the meanings they attach to local food products. Consumer trust attributes cover features that provide confidence in health benefits, safety, and overall quality. Region- or culture-specific attributes reflect links to identity, heritage, and traditional practices, such as typical flavours or recipes. Finally, systematic benefits include aspects that connect products to broader societal or environmental concerns, such as reduced additives, sustainable packaging, or innovative but responsible practices. In this sense, value proximity does not arise directly from attributes themselves, but from the extent to which consumers perceive these attributes as embodying values they personally consider important.

**Relational proximity** captures the significance of **interpersonal connections** in local food systems. Within that, we distinguish between consumer trust attributes, which are aspects related to interpersonal trust and the credibility of producers. Region/culture-specific attributes, (such as nationality of the producer or altruism) that influence consumer relationships with local food. Systematic benefits and innovation, the role of local food systems in fostering community

building and co-creation, strengthening both consumer-producer and consumer-consumer relationships.

**Geographic proximity** relates to the **explicit spatial and geographical locality** of food production and distribution. This dimension highlights consumer trust attributes, the impact of physical closeness on trust, emphasizing transparency in food sourcing. The role of the place: ethnocentrism and local patriotism in shaping consumer attitudes toward locally produced food. Systematic benefits include the advantages of ensuring sustainable food chains and accessibility to local food products.

In order to test this theoretical approach, empirical research has been designed, starting with a consumer scale development.

### 5.5 Consumer questionnaire development and selected methodologies

The consumer questionnaire development started with item generation for the scale to measure the nine dimensions of the theoretical model. The primary focus was on differentiating the statements based on the three proximity dimensions. Likert-scale statements were utilized to measure consumer perceptions. The goal was to develop a comprehensive set of items that thoroughly capture various aspects of consumer perceptions of local food. In this phase, it was crucial to consider factors such as context and the intended audience, including variables like connectivity, reading level, and available time, among others (DeVellis and Thorpe, 2021, as cited in Lamm et al., 2020). Additionally, further questions were included to understand willingness to pay (WTP), buying frequency, and the importance of local origin for different food types. Demographic questions were also incorporated. Inclusion and exclusion criteria were established to ensure the relevance and clarity of the items. As a result, 54 potential scale items were developed for the first version of the questionnaire, based on insights from both the literature and qualitative exploratory research.

Ensuring **reliability and validity** was a key guiding principle in this research, as it is essential for producing accurate and meaningful results. Given that this study involved the development of a new scale, its significance was further emphasized. Reliability refers to the consistency of a measurement over time, while validity ensures that the instrument measures what it is intended to measure. In this study, both qualitative (pilot test, test-retest reliability) and quantitative (expert interviews, consumer discussions) methods were applied. Reliability was assessed through test-retest reliability, internal consistency using Cronbach's Alpha, and split-half testing, conducted on a pilot study sample of 227 participants. Further statistical analyses

were conducted, including item-by-item examinations, Confirmatory Factor Analysis (CFA), and Principal Component Analysis (PCA). The results indicated good internal consistency, and the instrument demonstrated stability. However, as expected, proximities correlated with each other, and some items were overly complex. Split-half reliability results also suggested areas for improvement. Overall, the instrument exhibited strong internal consistency and stability (please find the detailed validation process in Appendix 1).

Based on insights gained from the pre-validation phase, several modifications were implemented in the final consumer survey (see Table 11 below). These primarily involved simplifying or specifying certain items in response to participant feedback and pilot test results. Additionally, some statements were removed or refined following expert evaluations in the face validity phase. The original Hungarian consumer questionnaire can be found in Appendix 2.

*Table 11 Local Food Proximity Scale: items and codes*

| | |
|---|---|
| ***VALUE PROXIMITY*** | |
| *Consumer trust* | |
| *VT1* | I think local food is healthier compared to other food products. |
| *VT2* | I think local food is safer compared to other food products. |
| *VT3* | I think local food is more reliable, quality-wise, compared to other food products. |
| *Culture- or region-specific attributes* | |
| *VC1* | I think local food is fresher compared to other food products. |
| *VC2* | I think local food is tastier compared to other food products. |
| *VC3* | I think local food is of higher quality compared to other food products. |
| *VC4* | I think local food is based more on traditional recipes and ingredients compared to other food products. |
| *VC5* | I think local food uses authentic patterns, shapes, and colours compared to other food products. |
| *VC6* | I think local food is a handcrafted product compared to other food products. |
| *VC7* | I think local food is more expensive compared to other food products. |
| *Systematic benefits* | |
| *VI1* | I think local food is more sustainable and considers environmental awareness compared to other food products. |
| *VI2* | I think local food uses less packaging compared to other food products. |
| *VI2a* | I think local food uses environmentally friendly materials for packaging compared to other food products. |
| *VI3* | In the case of local food, I can have more influence on product design, and it can be more customized to one's needs. |
| ***RELATIONAL PROXIMITY*** | |
| *Consumer trust* | |
| *RT1* | I have more trust in food products that I can buy directly from the producer. |
| *RT2* | I think local food is more reliable compared to other food products because I can get it from the person who produces it. |
| *RT3* | I think local food producers are more reliable than other producers. |
| *RT4* | I think local food producers are more credible than other producers. |
| *Culture- or region-specific attributes* | |
| *RC1* | I think local food is produced by farmers of Hungarian nationality. |
| *RC2* | I think, by preferring local food, I can support small-scale producers compared to other foods. |
| *RC3* | I think local food better reflects the region and heritage compared to other food products. |
| *Systematic benefits* | |
| *RI1* | When buying local food, I can directly ask the producer compared to other food products. |
| *RI2* | I feel that buying local food makes me part of a community. |
| *RI3* | In the case of local food, profits go directly to local farmers, compared to other food products. |
| *RI4* | When buying local food, I can be in direct contact with the producer. |
| ***GEOGRAPHIC PROXIMITY*** | |
| *Consumer trust* | |
| *GT1* | The closer a food product is produced, the more reliable it is. |
| *GT2* | I think local food is more reliable as I know where it's origin compared to other food products. |
| *GT3* | I think local food is more transparent in its geographic journey compared to other food products. |
| *Culture- or region-specific attributes* | |
| *GC1* | The food produced in my area is better than the ones produced in other places. |
| *GC2* | I think local food is more often seasonal compared to other food products. |
| *GC3* | I think local food better reflects the region and region's culture compared to other food products. |
| *GC4* | I think local food is made using ingredients from the region compared to other food products. |
| *Systematic benefits* | |
| *GI1* | The closer a food originates, the less environmental harm it causes. |
| *GI2* | Local food is easier to obtain due to the shorter distance. |
| *GI3* | I think local food is more sustainable because it has to travel less to reach consumers. |
| *GI4* | By purchasing local food, I can support the region's economic development. |

Source: *Self-edited table*

## 5.6 Data collection through a representative consumer survey in Hungary

The primary objective of the data collection process was to create a dataset representative of the Hungarian population, aligned with the age (by generation) and gender distribution recorded in the 2022 Census conducted by the Hungarian Statistical Office (KSH, 2022). To ensure inclusivity and relevance, the consumer questionnaire was developed in both online and offline formats, acknowledging that different age groups have varying preferences regarding digital tools.

### *5.6.1 Sampling Strategy*

The data collection began with convenience sampling, which helped establish an initial dataset primarily composed of younger consumers from the Central Hungary region. This method offered a quick and practical way to gather responses and create a foundation for further data collection. Subsequently, targeted sampling efforts were employed to address underrepresented demographic groups in the dataset. To achieve this, I have collaborated with various associations and organizations, including pensioner groups from across Hungary, elementary and nursery school workers (teachers, stuff, parents), as well as pensioner groups operating in different counties. These collaborations ensured broader participation from older age groups and other demographic segments that were initially underrepresented in the dataset, as well as engaging with consumers from various backgrounds. In total, the survey yielded responses from: 1312 participants via the online questionnaire, and 176 participants via the offline questionnaire. This brought the overall number of survey participants to 1489.

The original dataset consists of 65.21% females and 34.79% males, with an average age of 39.51 years. Most respondents (43.13%) are employed, followed by students (31.27%), retirees (18.4%), and smaller percentages of entrepreneurs, homemakers, and job seekers. Regarding household size, 33.90% live in two-person households, while 16.61% live alone. A significant majority (64.16%) consider their financial situation average, with 23.89% rating it above average. Considering the generations, 41.53% of the sample are Gen Z, 20.50% are Gen Y, 16.60% are Gen X, 17.81% are Baby Boomers, and 3.56% are Veterans.

### *5.6.2 Dataset cleaning*

The refinement of the dataset involved a systematic process to ensure both the quality and representativeness of the collected data. The first step focused on maintaining the reliability of the responses. Participants whose answers showed **clear inconsistencies** (e.g., providing highly contradictory responses to a control item that appeared twice in the questionnaire), or other signs of **random completion** (e.g., straight-lining resulting in zero variance across all scale

items) were excluded. Additionally, surveys with more than **25% of the questions left unanswered** were omitted, as incomplete data could undermine the validity of the dataset. These measures ensured that only high-quality responses were retained for further analysis.

In the second step, adjustments were made to **align the dataset with the demographic structure of the Hungarian population**, as specified by the 2022 Census. Overrepresented age and gender groups were proportionally reduced to achieve a balanced distribution (random selection was applied during this reduction process to avoid bias). This process aimed to create a final dataset that accurately reflected the population's characteristics (based on the 2022 Census conducted by the Hungarian Statistical Office (KSH, 2022)) and was suitable for representative analysis. Following these steps, the dataset was finalized with a total of 812 participants, providing a reliable foundation for subsequent research.

**Characteristics of the final sample**

By applying dataset adjustments, the final dataset accurately reflects the generational and gender composition of the Hungarian population, providing a reliable foundation for subsequent analysis.

*Table 12 Distribution of the sample by generation and gender compared to the 2022 Hungarian census*

| ***Generation***[3] | ***Birth year range*** | ***Census (%)*** | ***Dataset (%)*** |
|---|---|---|---|
| *Veterans* | 1928–1945 | 6.52 | 6.53 |
| *Baby Boomers* | 1946–1964 | 25.47 | 25.49 |
| *Generation X* | 1965–1980 | 29.56 | 29.56 |
| *Generation Y* | 1981–1996 | 25.38 | 25.37 |
| *Generation Z* | 1997–2006 | 13.08 | 13.05 |

| ***Gender*** | ***Census (%)*** | ***Dataset (%)*** |
|---|---|---|
| *Male* | *51.88%* | **51.97%** |
| *Female* | *48.12%* | **48.03%** |

Source: *Self-edited table*

However, regarding other characteristics, the sample does not fully align with the distribution of the Hungarian population. To minimize the risk of misleading scientific conclusions, I refrain from drawing inferences for variables where the sample does not meet representativity criteria. The following figures present the sample characteristics, including respondents' profession, the

[3] The generational boundaries were defined following the classification by Dimock (2019).

presence of a child under 15 years old in the household, number of people in the household, economic status (income), and distribution based on residence at the county level (NUTS2).

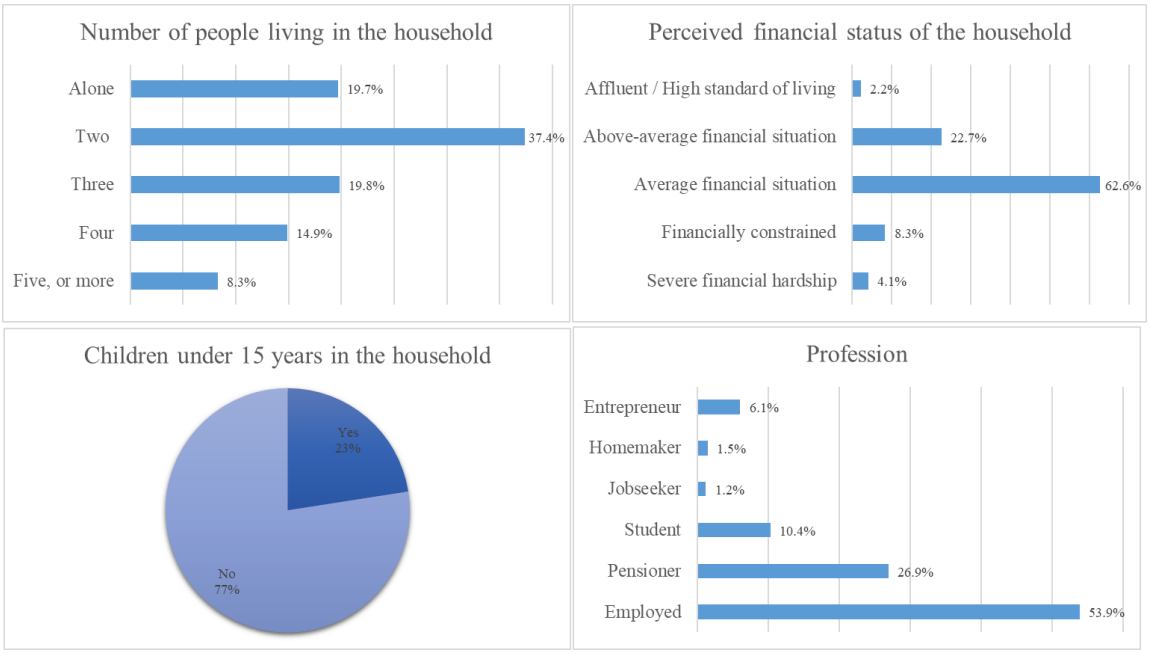


*Figure 5 Characteristics of the participants*

*Source: Self-edited figure*

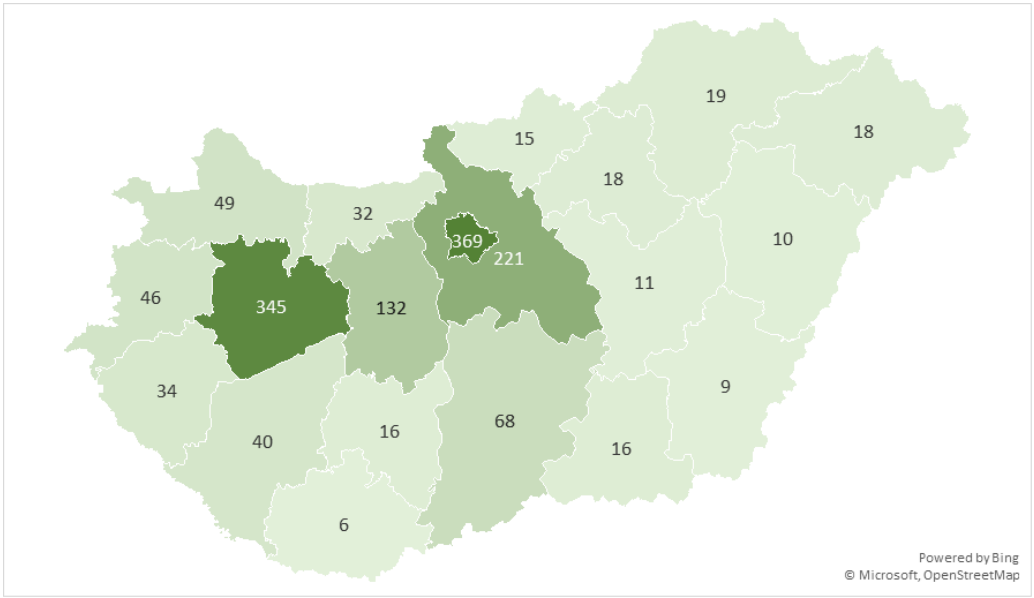


*Figure 6 Respondents based on the residence on county level (NUTS2) (frequency)*

*Source: Self-edited figure*

**Overview of the applied empirical analysis**

The empirical analysis investigates how consumers perceive local food through different types of proximity and how these perceptions influence behaviour.

The process began with **data preparation and item-level diagnostics**, including normality assessment, outlier detection, and internal consistency checks. These steps ensured the dataset was suitable for uncovering latent constructs and testing statistical models.

The next analytical phase addressed **Hypothesis H2.1**, which proposed that proximity is a multidimensional construct. To examine this, various dimensionality reduction methods were compared to identify the most appropriate structure for proximity perceptions. Based on both theoretical and empirical criteria, a **three-factor model** was selected and validated through confirmatory procedures. This measurement model formed the backbone for all subsequent hypothesis testing.

Building on this, the analysis examined whether proximity perceptions differ across **demographic groups** (H3.1–H3.3). Age, gender, and income were explored using both parametric and non-parametric tests, depending on distributional assumptions.

The relationship between proximity perceptions and **consumer behaviour** was investigated (H4.1–H4.2). Willingness to pay was modelled using **quantile regression** to account for skewed distributions, while **purchase frequency** was analysed through both machine learning (random forest) and traditional regression techniques.

The analysis followed a logical progression: from establishing a valid measurement model, through exploring group-level differences, to modelling behavioural outcomes. Each step built upon the previous one, ensuring conceptual and methodological coherence throughout the research.

The table below provides an integrated summary of the applied analytical methods and their role within the empirical workflow. These methodological steps are then elaborated in detail in the following sections, each dedicated to the examination of one hypothesis, ensuring transparency and traceability throughout the analysis.

*Table 13 Summary of the statistical methods used in the study*

| | Method | Purpose |
|---|---|---|
| *Data exploration* | Shapiro–Wilk test | Test for normality of variable distributions |
| | Histograms and boxplots | Visualize data distribution and detect skewness or outliers |
| | Kaiser–Meyer–Olkin (KMO) Test | Assess sampling adequacy for factor analysis |
| | Bartlett's Test of Sphericity | Determine factorability of the correlation matrix |
| *Reliability analysis* | Cronbach's Alpha | Assess internal consistency of item scales |
| | Split-Half Reliability | Evaluate consistency by dividing item sets |
| *Dimensionality reduction and factor analysis* | Network-Based Dimensionality Analysis | Identify clusters of items based on partial correlation networks |
| | Scree Plot (Spearman-based) | Estimate ideal number of latent factors |
| | Principal Component Analysis (PCA) | Extract uncorrelated components to explain maximum variance |
| | Independent Component Analysis(ICA) | Identify statistically independent latent sources |
| | Exploratory Factor Analysis (EFA) | Identify latent constructs |
| | Confirmatory Factor Analysis (CFA) | Validate latent structure and test model fit against theoretical expectations |
| | Model Comparison (AIC, BIC) | Compare competing models |
| | Nested $\chi^2$ Model Comparison | Test whether constrained models significantly reduce model fit |
| | Fit Indices (CFI, TLI, RMSEA, SRMR) | Evaluate the adequacy of measurement models |
| *Validity testing* | Composite Reliability (CR) | Test internal consistency of latent constructs |
| | Average Variance Extracted (AVE) | Assess convergent validity of item sets |
| | Heterotrait–Monotrait Ratio (HTMT) | Evaluate discriminant validity between latent constructs |
| | Variance Inflation Factor (VIF) | Check multicollinearity among predictors |
| *Regression and prediction* | Mann–Whitney U (Wilcoxon Rank-Sum) | Compare two independent groups (non-parametric) |
| | Kruskal–Wallis Test | Compare more than two groups on ordinal variables |
| | Dunn's post-hoc test | Conduct pairwise group comparisons |
| | One-way ANOVA and Tukey HSD | Test for mean differences and homogeneous subgroups |
| | Cliff's Delta | Estimate effect size |
| | Eta-squared ($\eta^2$), Omega-squared ($\omega^2$) | Assess effect size in ANOVA contexts |
| | Quantile Regression ($\tau$ = 0.25, 0.5, 0.75) | Estimate effects across the distribution of WTP |
| | Breusch–Pagan test | Detect heteroskedasticity in regression models |
| | Brant test | Test proportional odds assumption (ordinal regression suitability check) |
| | Multinomial logistic regression | Model multi-level categorical outcomes (purchase frequency) |
| *Machine learning classification* | Random forest classifier | Predict categorical purchase frequency and assess model accuracy |
| | Boruta feature selection | Identify significant predictors using permutation-based importance scoring |
| | Confusion matrix | Evaluate classification performance (train/test accuracy, overfitting) |
| *Data visualization* | Heatmaps with hierarchical clustering | Visualize factor loading patterns and variable grouping |
| | Boxplots and bar charts | Compare distributions and subgroup differences |
| | Histograms and density plots | Examine skewness and distribution of key variables |
| | Scatter Plots | Visualize predictor–outcome relationships |

Source*: Self-edited table*

# 6 Results

This chapter presents the empirical findings of the study, organized according to the main research questions and hypotheses. The analysis begins by identifying and validating **the latent structure underlying consumer perceptions of local food**, focusing on three proximity dimensions. Through a series of dimensionality reduction techniques, the multidimensional nature of perceived proximity is confirmed.

Subsequent sections examine how **proximity dimensions vary across key sociodemographic variables** such as age, gender, and income. Both parametric and non-parametric statistical methods are applied to assess group-level differences. Finally, the chapter explores the predictive role of **proximity in shaping consumer behaviour**, specifically in terms of willingness to pay and purchase frequency. Here, advanced modelling approaches such as quantile regression, random forest classification, and multinomial logistic regression are employed to identify patterns and explain heterogeneity in consumer decisions. These results provide a comprehensive understanding of how Hungarian consumers perceive and respond to local food in relation to perceived proximity.

## 6.1 Examining H2.1

**RQ2**: What types of proximity influence Hungarian consumers' perception of local food?

**H2.1**: Hungarian consumers perceive local food through multiple proximity dimensions, including relational and value proximity alongside geographic proximity.

**This chapter aims to identify and validate the latent structure of consumer perception of local food, focusing on three theoretically grounded proximity dimensions: value-based, relational, and geographic.** The analytical process started with estimating the ideal number of latent factors using a scree plot and network-based dimensionality analysis (NDA). Then, several factor extraction methods including: Principal Component Analysis (PCA), Independent Component Analysis (ICA), and Exploratory Factor Analysis (EFA) were compared.

To guide the selection of the most appropriate method, I defined specific criteria in advance: the method had to yield clearly **distinguishable** and interpretable latent constructs; reflect the theoretically expected **interrelatedness** among the proximity dimensions and provide a transparent and **stable factor structure**. Based on these criteria, the most appropriate approach was selected and subsequently tested, to assess the reliability, validity, and conceptual clarity of the resulting dimensions.

### *6.1.1 Estimating the ideal number of latent variables*

To determine the optimal number of latent variables underlying perceived proximity, I applied a combination of statistical and theoretical considerations. This step served as the foundation for all subsequent dimensionality reduction and measurement modelling procedures. Two methods were used to estimate the ideal number of factors: a scree plot based on Spearman's rank correlation matrix and network-based dimensionality analysis (NDA).

**Scree plot based on the Spearman correlation matrix**

As the proximity-related items are measured on an ordinal scale, a correlation matrix based on Spearman's rho was used to generate the Scree plot. The visual inspection of the scree plot revealed a marked drop in eigenvalues after the second component, followed by a noticeable flattening from the third component onward. This "elbow" indicates that three to four components explain a substantial portion of the variance, suggesting a multidimensional

structure. The Kaiser criterion also supported retaining components with eigenvalues greater than 1, which corresponded to the first three factors.

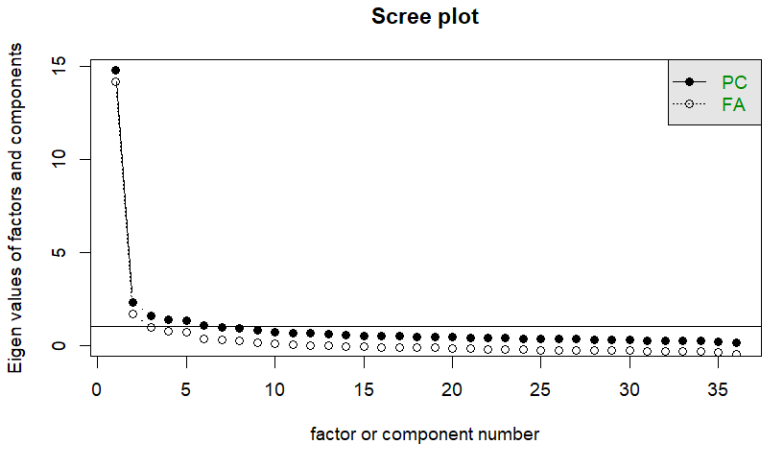


*Figure 7 Scree plot of eigenvalues based on the Spearman correlation matrix (estimation of ideal number of latent variables)*

Source: *Self-edited figure generated in R using the scree() function from the psych package based on a Spearman correlation matrix.*

This result aligns with theoretical expectations: proximity perceptions are hypothesized to consist of three interrelated but distinct components, each of which may represent a separate underlying construct.

**Network-Based Dimensionality Analysis (NDA)**

To complement the eigenvalue-based approach, I applied NDA (Kosztyán et al., 2022), a method that identifies clusters of items based on their partial correlation network structure. NDA offers a data-driven yet interpretable strategy to estimate dimensionality, especially in contexts where constructs are expected to be interrelated.

*Table 14 Network-based Dimensionality Analysis (NDA) results: factor structure and theoretical alignment*

| Factor | Primary Items (>0.70 loading) | Theoretical categories |
|---|---|---|
| **NDA1** | RI1-4 (0.73-0.75), RC2 (0.73), GI4, GT3, GI3 (0.70-0.74) | mixed: relational + geographic items |
| **NDA2** | VC3, VT3 (0.80, 0.79), VT1, VT2 (0.78, 0.77), RT3, RT4 (0.77, 0.76), VC2, RT2, GT2 (0.74-0.75) | mixed: value + relational items |
| **NDA3** | RC3, GC3 (0.90), VC4 (0.83) | non-theoretical |

Source: *Self-edited table based on the network-based dimensionality analysis conducted using the ndr() function from the NDR R package (Kosztyán et al., 2022)*

The NDA suggested a three-factor solution. While the item groupings did not give back well the theoretical structure, the analysis confirmed that the data support a tripartite organization. For instance, one of the NDA factors combined primarily geographic and relational items, while another combined value- and time-related items. Several variables showed cross-loadings or weak network connectivity, highlighting potential measurement noise (e.g., VC7).

Despite deviations from the theoretical constructs, NDA proved useful for confirming the expected dimensionality. It suggested that a three-factor model is statistically justified, even if the precise item composition requires further refinement through traditional factor analysis.

### *6.1.2 Selecting the factor extraction model for latent variable construction*

After establishing that three latent dimensions underlie consumer perceptions of proximity, the next step was to identify the most appropriate method for extracting the latent variables. Given the conceptual relevance of the proximity dimensions, it was important to ensure that the factor extraction method not only captures statistical patterns in the data but also aligns with the theoretical framework behind the study. To guide the model selection process, I defined key criteria that a suitable method must meet:

1. **Latent variable identification**: The method should extract interpretable latent constructs that can be meaningfully labelled based on the proximity theory.
2. **Discriminant distinctiveness**: The resulting factors should be sufficiently distinct from one another, minimizing cross-loadings and ensuring that each factor reflects a unique conceptual domain.
3. **Reflection of interrelatedness**: Since proximity dimensions are theorized to be conceptually correlated, the method should allow for and capture inter-factor correlations, rather than enforcing artificial independence.
4. **Clarity of factor loadings**: The association between items and latent dimensions should be transparent and interpretable, ideally with minimal complexity or ambiguity.
5. **Theoretical interpretability**: The resulting structure must be coherent with proximity theory, rather than merely maximizing statistical fit without conceptual alignment.

Based on these criteria, three techniques were selected for comparison, Principal Component Analysis (PCA); Independent Component Analysis (ICA) and Exploratory Factor Analysis (EFA). Each method was applied to the same dataset of proximity-related items, and the results

were examined in light of the above criteria. The following sections present this analysis and explain the rationale behind the final model selection.

**Principal Component Analysis (PCA)**

To identify the underlying structure of the proximity-related items and to determine whether they form coherent latent constructs, Principal Component Analysis (PCA) was applied. The analysis focuses on reducing the observed variables into three theoretically driven dimensions: value, relational, and geographic proximity.

Given the ordinal nature of the measurement scales, PCA was performed on the Spearman correlation matrix. A preliminary assessment of sampling adequacy using the Kaiser–Meyer–Olkin (KMO) test yielded an overall MSA of 0.96, indicating excellent suitability for factor analysis (Kaiser, 1974).

To determine the appropriate number of components, a scree plot based on Spearman correlations was examined. According to the Kaiser criterion and the elbow rule, three components with eigenvalues greater than 1 were retained. These three components accounted for a substantial proportion of the total variance and aligned with the hypothesized proximity dimensions.

The PCA was conducted with Promax rotation to allow for correlated factors. Variables with communalities below 0.25 were excluded to improve the internal consistency of the solution. The final model included 38 proximity-related items grouped into three components. All retained items exhibited acceptable communalities, with most values exceeding the preferred 0.40 threshold. This indicates that the items contributed meaningfully to the latent structure and supports the robustness of the selected components.

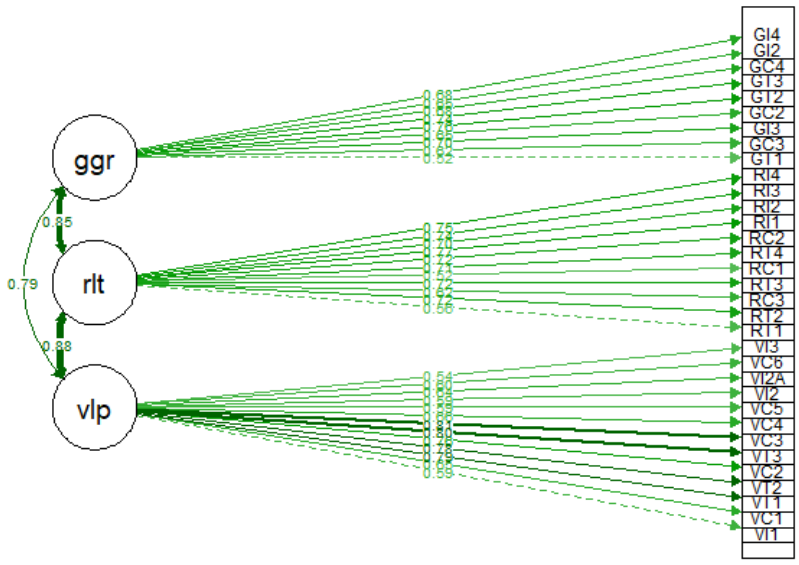


*Figure 8 Visualized structural model based on PCA-derived components*

Source: *Own visualization using the semPaths() function from the semPlot R package*

The extracted components were then visualized using a structural equation model (SEM), which confirmed the strong conceptual coherence of the three constructs. However, intercorrelations between the latent variables were notably high (e.g., r = 0.88 between value (vlp) and relational (rlt) proximity), suggesting conceptual overlap. While PCA provided a statistically sound and internally consistent structure, the limited discriminant validity called for alternative methods.

Despite the statistical adequacy of PCA, its conceptual limitations in this context must be examined. PCA assumes that the observed variables are linear combinations of uncorrelated components, which may not fully capture the theoretically intertwined nature of proximity dimensions. In particular, the goal of this research was not only to reduce data but also to ensure conceptual distinctiveness among value, relational, and geographic proximity. The high correlations among the extracted components indicate that PCA fails to establish sufficient discriminant validity. This undermines the theoretical assumption that these dimensions represent separate constructs in the minds of consumers.

**Independent Component Analysis (ICA)**

Independent component analysis represents a different approach to dimensionality reduction compared to PCA. While PCA seeks uncorrelated components that maximize explained variance, ICA identifies components that are statistically independent, a more stringent mathematical criterion. This distinction is particularly relevant in social science research

contexts, where the goal extends beyond variance maximization to uncovering underlying latent sources or signals that combine to produce observed behavioural patterns.

The theoretical foundation of ICA assumes that observed variables represent linear mixtures of independent latent sources. In this context of proximity perceptions, this means the assumption that consumer responses reflect the combined influence of distinct, non-overlapping cognitive processes or perceptual mechanisms. This approach could provide better construct separation compared to PCA, potentially resolving the discriminant validity concerns identified in the previous analysis.

ICA was implemented with three components, consistent with the dimensionality established through previous analyses. The analysis utilized complete cases from the proximity dataset, ensuring robust parameter estimation without missing data complications.

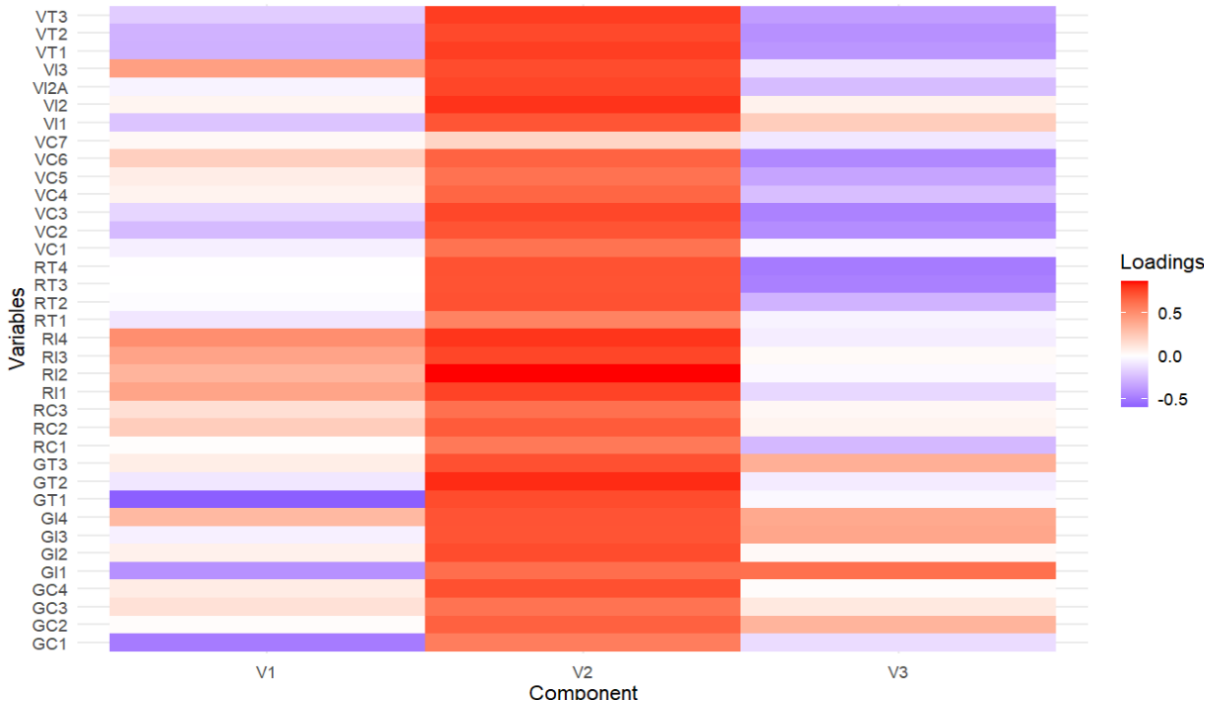


*Figure 9 Independent Component Analysis (ICA) - Loadings across the three extracted components*

Source: *own calculation using (fastICA) and visualization with ggplot2 and reshape2 in R.*

The ICA solution revealed a complex loading structure that deviated significantly from theoretical expectations.

- Independent component 1 (V1): Exhibited prominent negative loadings for geographic proximity items (particularly GT1, GC1), suggesting a distinct geographic dimension.

However, the negative orientation complicates direct interpretation, as component direction in ICA is mathematically arbitrary.

- Independent component 2 (V2): Demonstrated consistently high positive loadings across virtually all proximity items, indicating a general proximity perception factor that aggregates shared variance across all theoretical dimensions. This component seems to capture overall proximity sentiment rather than dimensional specificity.
- Independent component 3 (V3): Displayed weaker, mixed loadings with limited interpretable structure, suggesting minimal conceptual coherence or explanatory power.

Despite the mathematical value, several fundamental limitations emerged that render ICA unsuitable for this research context. The ICA solution failed to generate clearly separated constructs corresponding to the hypothesized geographic, relational, and value-based proximity dimensions. The overlap of high loadings across item types undermines the primary research objective of dimensional distinction. ICA components lack inherent interpretational anchoring, with positive/negative orientations that complicate theoretical understanding. Unlike factor analysis approaches that can be meaningfully rotated and interpreted, ICA components require additional post-hoc procedures for practical application. While mathematically independent, the components lack clarity and practical usability in consumer research context.

Although ICA offers a mathematically sophisticated approach to uncovering independent sources of variation, it proves inadequate for theory-driven latent variable modelling in this proximity perception context. The method fails to satisfy the dual requirements of dimensional distinctness and theoretical interpretability that are essential for subsequent measurement model development and hypothesis testing.

**Exploratory Factor Analysis (EFA) with varimax rotation**

Exploratory Factor Analysis represents a data reduction technique designed to uncover the underlying latent structure within large sets of observed variables. Unlike the previously examined methods, EFA operates without requiring predefined structural assumptions, making it valuable for identifying meaningful, interpretable factors that explain correlations among measured items. In the context of proximity perceptions, EFA offers the potential to determine whether proximity-related items naturally cluster into theoretically meaningful constructs corresponding to value-based, relational, and geographic proximity dimensions.

EFA was conducted using the minimum residual method with Varimax rotation on the Spearman correlation matrix to accommodate the ordinal nature of the proximity items. The

analysis extracted three factors consistent with the dimensionality established through previous assessments. Varimax rotation was initially selected to maximize factor interpretability by producing orthogonal factors with simplified structure, where each variable loads primarily on one factor while minimizing cross-loadings.

The EFA solution demonstrated better interpretability compared to both PCA and ICA approaches. The three extracted factors collectively explained 47.8% of the total variance, with the following distribution:

- Factor 1 (MR1): 19.0% of variance (SS loadings = 6.85)
- Factor 2 (MR3): 14.6% of variance (SS loadings = 5.26)
- Factor 3 (MR2): 14.2% of variance (SS loadings = 5.10)

The root mean square of residuals (RMSR = 0.04) and fit indices (0.99) indicated good model adequacy, while the df-corrected RMSR (0.05) suggested acceptable approximation quality.

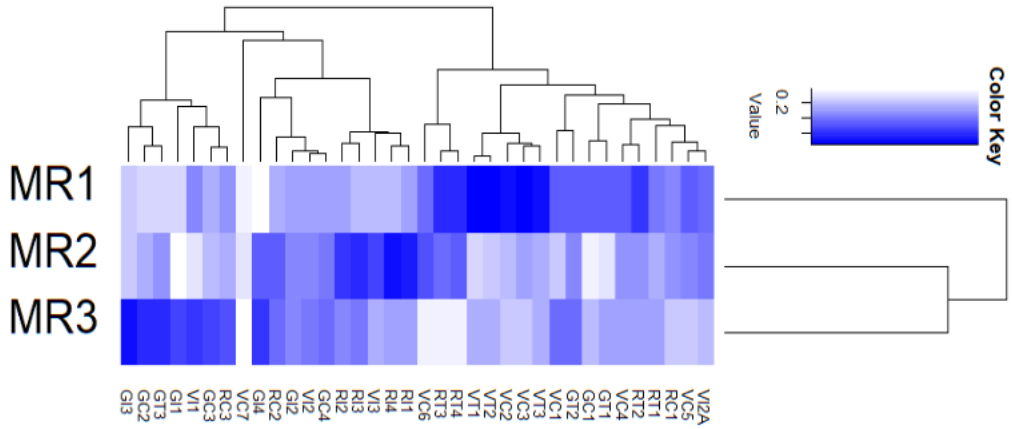


*Figure 10 EFA (varimax) factor loading structure with hierarchical clustering*

Source: *Self-edited figure based on EFA using the psych and gplots packages in R*

The heatmap visualization illustrates the factor structure, with distinct clustering patterns corresponding to each theoretical proximity dimension. The hierarchical clustering dendrogram reveals natural groupings of variables that align with the extracted factors.

Using established factor loading interpretation criteria (loadings ≥ 0.55 indicating strong relationships; Hair et al., 2019), the three factors demonstrated theoretical coherence:

*Table 15 Factor structure of proximity dimensions based on (EFA varimax)*

| Factor | Core content (%) | Strong Loadings (>0.70) | Moderate/Supporting Loadings (0.50–0.70) |
|---|---|---|---|
| **Factor 1** value | ~53% value-related | VT1 (0.738), VT2 (0.745), VC2 (0.705), VT3 (0.708), VC3 (0.741) | RT2 (0.572), RT3 (0.626), RT4 (0.616) |
| **Factor 2** relational | ~60% relational | RI1 (0.670), RI2 (0.567), RI3 (0.618), RI4 (0.694) | VI3 (0.550), VC6 (0.516) |
| **Factor 3** geographic | ~78% geographic | GI3 (0.703), VI1 (0.600), GT3 (0.631), GC2 (0.602) | GI1 (0.545), GC3 (0.538), GI4 (0.589) |

Source: *author's own calculation based on EFA using the psych package in R.*

Several variables exhibited notable cross-loadings, indicating conceptual overlap between proximity dimensions, such as VC1 (MR1: 0.461, MR3: 0.445): Similar contributions to value and geographic factors; GT2 (MR1: 0.476, MR3: 0.443): Moderate loadings on both value and geographic factors, and GC4 (MR3: 0.427, MR2: 0.408): Shared loading between geographic and relational factors. These cross-loadings suggest that proximity perceptions, while distinguishable, maintain conceptual interconnectedness consistent with theoretical expectations.

The EFA-derived factor scores revealed substantial inter-factor correlations when calculated using items with loadings ≥ 0.55:

- value ↔ relational: r = 0.64
- value ↔ geographic: r = 0.53
- relational ↔ geographic: r = 0.59

The observed inter-factor correlations substantially exceeded the commonly accepted threshold of $r = 0.30$, providing empirical justification for employing oblique rotation. As recommended in general methodological literature (Hair et al., 2010), such correlations warrant the use of rotation methods like Promax, which better accommodate the conceptual interrelatedness of latent constructs—particularly relevant in the context of proximity dimensions.

The EFA varimax solution addressed the primary methodological objectives established for factor extraction. The three factors demonstrated good theoretical coherence, aligning closely with hypothesized proximity dimensions. While maintaining conceptual relationships, the factors showed sufficient distinctiveness to support separate measurement constructs. The factor structure closely approximated the theoretical framework, with each factor capturing its hypothesized proximity domain. Excellent fit indices and factor score adequacy measures

confirmed the statistical validity of the solution. However, the **observed inter-factor correlations** suggest that future analyses should consider **oblique rotation** methods to better capture the natural interrelatedness of proximity dimensions while maintaining construct distinctiveness.

**Exploratory Factor Analysis (EFA) with promax rotation**

The initial assessment of factor structure using orthogonal rotation (varimax) revealed substantial inter-factor correlations that exceeded the recommended threshold of 0.30 for maintaining orthogonality. These findings provided empirical justification for employing oblique rotation methods that accommodate the natural interrelatedness of proximity dimensions while preserving construct distinctiveness. Unlike orthogonal rotations that force factors to remain uncorrelated, Promax allows factors to correlate while still seeking a simple structure with clear item-to-factor loadings. This approach aligns with the theoretical expectations, while conceptually distinct, are naturally interrelated aspects of consumer perception of local food systems.

The analysis was performed on a Spearman correlation matrix to accommodate the ordinal nature of the proximity measures. A three-factor solution was specified based on the evidence from scree plot analysis and NDA. The correlation matrix was computed using pairwise complete observations to handle missing data appropriately. The analysis included 36 proximity-related items covering various dimensions of consumer perception toward local food products.

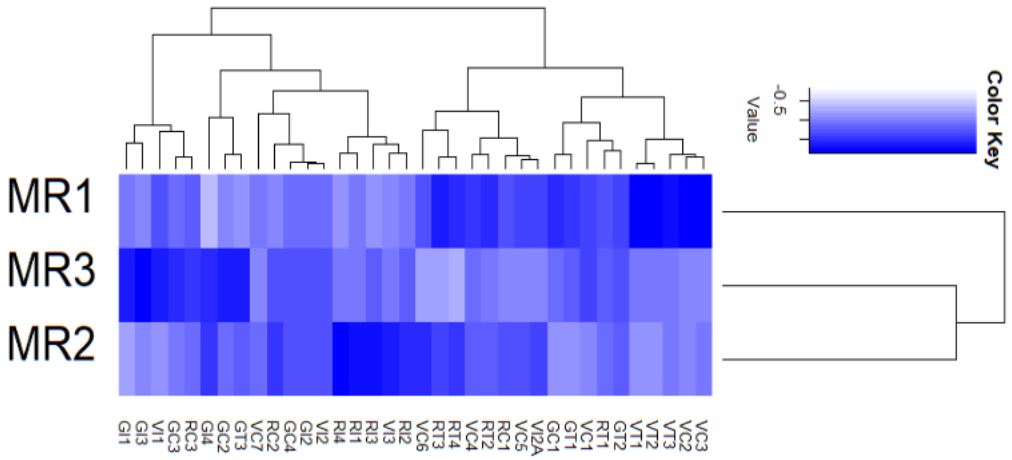


*Figure 11 EFA (promax) factor loading structure with hierarchical clustering*

Source*: Self-edited figure based on EFA using the psych and gplots packages in R*

The three-factor Promax solution explained 48% of the total variance, with individual factors accounting for 19%, 15%, and 13% of the variance respectively. The proportional explained variance among the three factors was 40%, 32%, and 28%, indicating a relatively balanced contribution of each dimension to the overall construct space.

The Promax rotation revealed moderate to strong **correlations among the three proximity factors** (value-relational: r = 0.69; value-geographic: r = 0.60; relational-geographic: r = 0.64). These correlations align with the theoretical expectation that proximity dimensions are interrelated aspects of a broader consumer perception construct. The correlations are substantial enough to suggest meaningful conceptual overlap yet support the distinctiveness of each dimension.

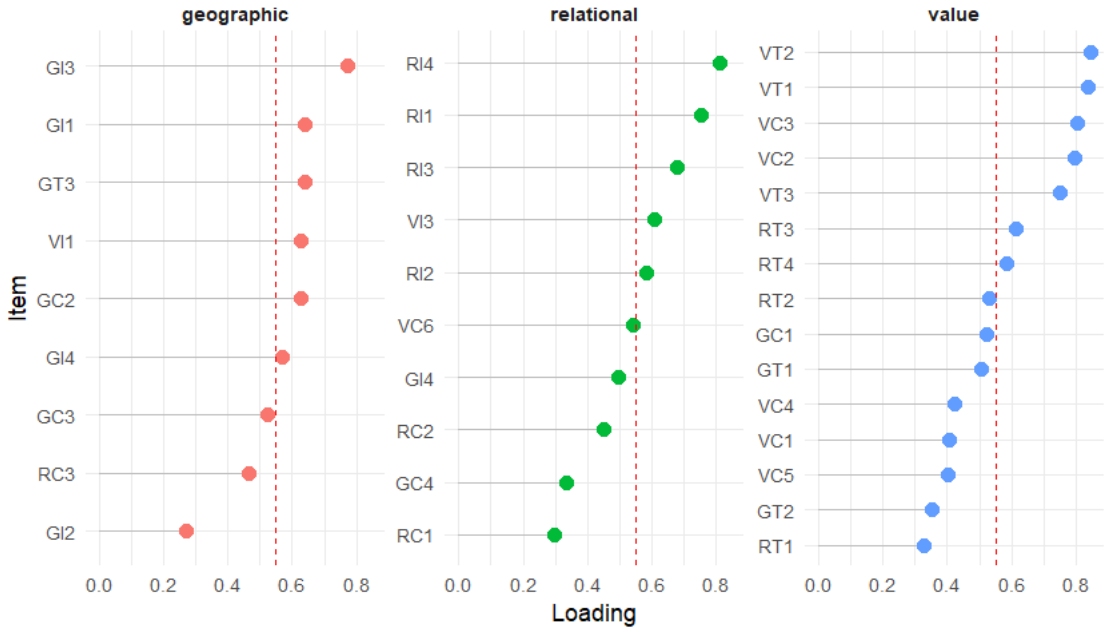


*Figure 12 Factor loadings of proximity dimensions identified through EFA with promax rotation*

Source*: Self-edited figure based on Promax-rotated exploratory factor analysis using the psych package in R*

The three-factor model demonstrated **good fit** to the data:

- Root Mean Square of Residuals (RMSR): 0.04
- Degrees of freedom corrected RMSR: 0.05
- Fit based on off-diagonal values: 0.99

**Model fit comparison**

To determine whether proximity can be best represented as a single general construct or as three distinct latent dimensions, I compared a one-factor and a three-factor model using confirmatory factor analysis.

*Table 16 Model comparison of one-factor vs. three-factor structures based on CFA promax*

| Fit measure | Three-factor model | One-factor model |
|---|---|---|
| **AIC** | 34043.69 | 35634.39 |
| **BIC** | 34307.72 | 35884.52 |
| **CFI** | 0.912 | 0.721 |
| **TLI** | 0.898 | 0.683 |
| **RMSEA** | 0.07 | 0.125 |
| **SRMR** | 0.05 | 0.094 |

***Source**: Self-edited table based on CFA models estimated with the lavaan package in R*

The results favored the three-factor model, which yielded substantially lower AIC (34043.69 vs. 35634.39) and BIC (34307.72 vs. 35884.52) values compared to the one-factor solution.

These findings provide evidence that value-based, relational, and geographic proximity represent empirically distinct constructs rather than a unidimensional proximity factor. The large differences in information criteria (ΔAIC = 1590.7; ΔBIC = 1576.8) exceed the conventional thresholds, confirming the theoretical expectation of a multidimensional proximity structure. Conventional goodness-of-fit indices further support the three-factor model. The Comparative Fit Index (CFI = 0.912) and Tucker–Lewis Index (TLI = 0.898) both approach or exceed the commonly accepted 0.90 threshold, indicating acceptable model fit. The Root Mean Square Error of Approximation (RMSEA = 0.070) also falls within the acceptable range (<0.08), and the Standardized Root Mean Square Residual (SRMR = 0.050) suggests a close correspondence between the observed and predicted covariances. By contrast, the one-factor model performs considerably worse across all indices (CFI = 0.721, TLI = 0.683, RMSEA = 0.125, SRMR = 0.094), showing that the data structure is better explained by three correlated latent constructs rather than a single general factor.

**Nested model comparison (chi-square)**

To test whether the three-factor structure provides a better fit than a constrained version treating all proximity dimensions as statistically indistinct, a nested model comparison was also conducted. In this test, the three-factor model was re-estimated with the correlations among the three latent variables (value-based, relational, and geographic proximity) fixed to 1. This

constrained model represents a more restrictive theoretical assumption, that the proximities reflect a single undifferentiated construct rather than distinct dimensions. The chi-square difference test yielded a statistically significant result ($\mathbf{\Delta\chi^2(3) = 103.14, p < 0.001}$), indicating that allowing the proximity constructs to correlate freely captures meaningful variance that is lost when they are forced to be interchangeable. This supports the conclusion that the **three proximity constructs are empirically distinct and should not be treated as a single latent factor**. The significant chi-square difference confirms that the multidimensional specification better reflects the underlying structure of consumer perceptions.

To assess whether the three proximity constructs exhibit multicollinearity when used as predictors in a regression model, I calculated Variance Inflation Factor (VIF) values. The results were as follows: value: 1.74; relational: 2.11; geographic: 1.69. All VIF values were well below the commonly used thresholds of concern (VIF < 5), indicating that **multicollinearity is not an issue in this model**. According to established guidelines, values between 1 and 2.5 reflect very low multicollinearity and are not problematic. These findings suggest that the three proximity dimensions provide sufficiently independent explanatory power, and the regression coefficients can be interpreted without distortion due to overlapping variance.

**Discriminant validity and convergent validity**

To evaluate the discriminant validity of the three proximity constructs, I applied the Heterotrait–Monotrait ratio of correlations . The HTMT is a robust method for assessing whether constructs in a CFA model are empirically distinct. According to established guidelines, values below 0.85 (or 0.90 under more liberal criteria) indicate acceptable discriminant validity.

The HTMT ratios for value vs. relational: 0.705, indicating good discriminant validity, for value vs. geographic: 0.566, indicating strong discriminant validity, and for relational vs. Geographic: 0.762, showing acceptable discriminant validity. All values fall below the conservative threshold of 0.85, indicating that the three **proximity dimensions are sufficiently distinct from each other**. This supports the theoretical assumption that they capture different aspects of how consumers perceive locality, justifying their separate inclusion in further modeling.

To evaluate the **convergent validity** of the three latent proximity constructs (value-based, relational, and geographic), I calculated two key indicators: composite reliability (CR) and average variance extracted (AVE). Convergent validity reflects the extent to which items that are theoretically related to the same construct are indeed strongly correlated. **Composite reliability (CR)** measures the internal consistency of the items forming each latent factor. A

CR value ≥ 0.70 is generally considered acceptable, indicating that the items reliably measure the underlying construct. **Average variance extracted (AVE)** captures the amount of variance in the observed variables that is accounted for by the latent factor, relative to measurement error. An AVE of at least 0.50 indicates sufficient convergent validity.

*Table 17 Convergent validity of the three proximity constructs based on composite reliability (CR) and average variance extracted (AVE)*

| Latent factor | CR | AVE | Interpretation |
|---|---|---|---|
| **Value** | 0.920 | 0.622 | excellent reliability and validity |
| **Relational** | 0.881 | 0.599 | good reliability and validity |
| **Geographic** | 0.845 | 0.478 | reliability acceptable; AVE slightly below 0.50 |

Source*: Self-edited, based on calculations in R using the lavaan package*

CR values for all three constructs exceed the threshold of 0.70, confirming strong internal consistency. The AVE values for value proximity and relational proximity are above the recommended threshold of 0.50, indicating adequate convergent validity. Although geographic proximity has an AVE of 0.478, which is slightly below the cutoff, it remains close enough to be considered acceptable in exploratory research settings, particularly given its strong CR value. These results support the robustness of the three-factor measurement model by confirming that each set of items converges on its respective construct.

The final selection of AFA with promax rotation was the result of a systematic comparison of alternative dimensionality reduction techniques, evaluated against both theoretical and empirical criteria. While PCA and ICA provided initial insights, they failed to achieve sufficient conceptual clarity or discriminant validity across proximity dimensions. EFA with orthogonal rotation revealed substantial factor correlations, further reinforcing the theoretical expectation of interrelated constructs. The use of Promax rotation allowed for a more accurate representation of the latent structure by accommodating these inter-factor relationships. This choice ensured a **balance between empirical rigor and theoretical fidelity**, enabling the identification of three distinct yet interconnected proximity dimensions—value-based, relational, and geographic—that form the foundation of the subsequent structural modelling.

**Hypothesis evaluation – H2.1**

The aim of H2.1 was to examine whether Hungarian consumers perceive local food through multiple proximity dimensions, including relational and value proximity alongside geographic proximity. To test this multidimensional conceptualization, I applied a comprehensive set of factor analytic procedures to uncover and validate the latent structure of proximity perceptions.

The analysis began with the estimation of dimensionality using a scree plot and network-based dimensionality analysis (NDA). Both methods indicated a three-factor solution, consistent with the theoretical proposition that proximity is not unidimensional but consists of distinct value-based, relational, and geographic elements. To identify the optimal extraction method, I compared PCA, ICA, and EFA, evaluating each according to criteria such as interpretability, theoretical coherence, and the ability to reflect inter-factor correlations. While PCA and ICA were either conceptually ambiguous or yielded overly general components, EFA with Promax rotation provided a structure that was both interpretable and aligned with theoretical expectations. The three extracted factors showed strong internal consistency and clear conceptual distinction.

A CFA confirmed the superiority of the three-factor model over a unidimensional alternative. The model demonstrated substantially better fit across information criteria ($\Delta$AIC = 1590.7; $\Delta$BIC = 1576.8) and fit indices (CFI = 0.912; RMSEA = 0.070; SRMR = 0.050), indicating that the **proximity dimensions are empirically distinct**. A nested model comparison further supported this distinction ($\Delta\chi^2(3) = 103.14$, $p < 0.001$), showing that treating the three proximity constructs as interchangeable significantly worsened model fit.

Low VIF values (<2.5) ruled out multicollinearity, while HTMT ratios (<0.85) confirmed discriminant validity. CR values exceeded 0.84, and AVE values supported convergent validity for value and relational proximity, with acceptable results for geographic proximity. These findings confirm that the three proximity dimensions are distinct.

Based on these converging lines of evidence, **Hypothesis H2.1 is supported**: Hungarian consumers do not perceive local food solely through geographic closeness, but rather **through a multidimensional lens that also includes relational ties and value-based attributes**.

Thesis: Hungarian consumers perceive local food through a multidimensional framework of proximity, shaped by three distinct but interconnected dimensions: geographic, relational, and value-based proximity. These proximity types are empirically distinguishable yet conceptually interrelated, and they jointly influence how consumers interpret the concept of local food. Consumer understanding of locality is therefore inherently multidimensional.

## 6.2 Examining H3.1

**RQ3**: How do demographic characteristics influence Hungarian consumers' perceived proximity of local food?

**H3.1:** Consumers' perception of local food varies across different age groups.

To examine whether consumers' perception of local food varies across age groups, I have combined both non-parametric and parametric methods. The three proximity dimensions served as dependent variables, while respondents were classified into four chronological age groups (18–29, 30–39, 40–59, and 60+ years) reflecting distinct life stages.

Given the moderate deviation from normality in the distribution of proximity scores, the Kruskal–Wallis test was used to detect overall differences between age groups without assuming normality. To complement this, a one-way ANOVA was also conducted for each proximity dimension, as it is generally robust to slight violations of normality, particularly in large and relatively balanced samples. To identify specific between-group differences, Dunn's test with Bonferroni correction was applied following the Kruskal–Wallis analysis. In parallel, Tukey's Honest Significant Difference (HSD) test was performed as a post-hoc analysis for the ANOVA models to support the identification of statistically homogeneous subsets. Effect size measures ($\eta^2$ and $\omega^2$) were calculated to assess the proportion of variance in proximity perceptions explained by age group, allowing a more nuanced interpretation of practical relevance.

The analysis adopted age groups based on chronological age (18–29, 30–39, 40–59, 60+) rather than generational categories (e.g., Gen Z, Millennials). This methodological choice was made for several reasons: first, the sample sizes in certain generational cohorts were too small for reliable inference, and developmental differences may better explain variation in proximity perception than broad generational identity.

Variance Inflation Factors (VIF) were calculated to assess multicollinearity among demographic predictors (AGE, INCOME, GENDER). All VIF values were below 2.5, confirming **no multicollinearity concerns** and reliable interpretation of age effects across all three proximity dimensions.

The figure below presents boxplot visualizations showing the distribution of proximity scores across age groups for all three dimensions.

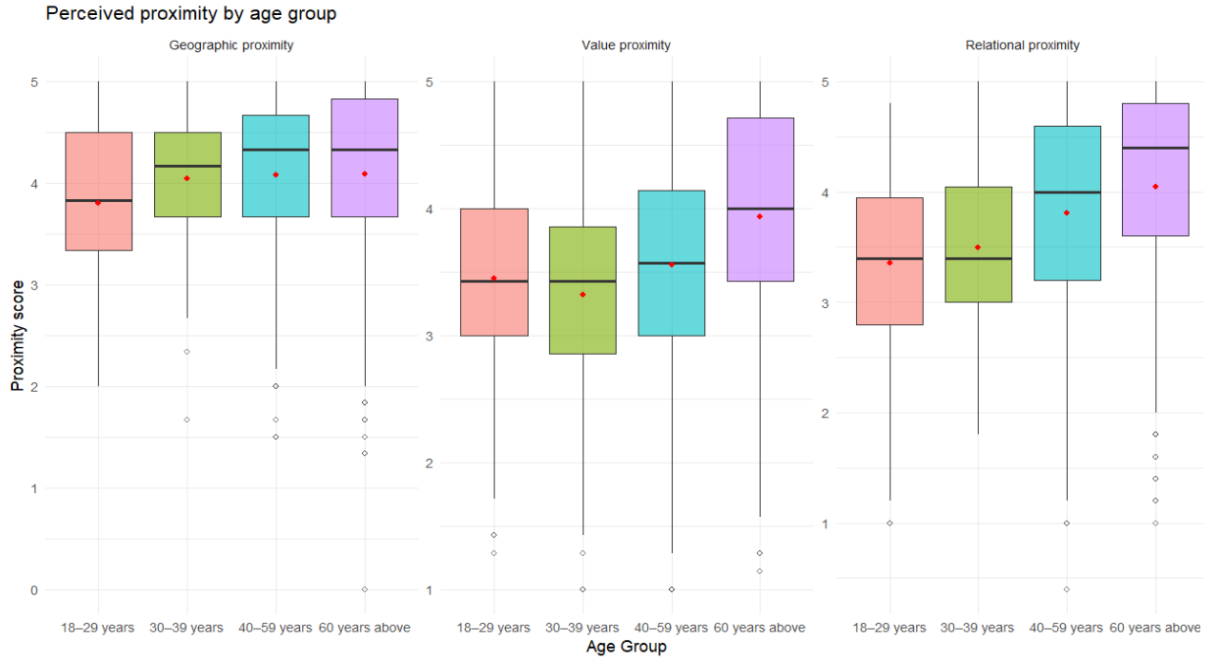


*Figure 13 Boxplot diagram, perceived proximity of local food across age groups in three proximity dimensions (geographic, value, relational)*

Source*: Self-edited figure using ggplot2 and tidyr packages in R.*

The plots reveal that the youngest age group (18–29 years) consistently showed lower median scores, while the oldest group (60+ years) demonstrated the highest perceived proximity scores across geographic, value, and relational dimensions.

The **Kruskal-Wallis tests** revealed statistically significant differences across age groups for all three proximity dimensions:

- geographic proximity: $\chi^2 = 22.106$, $p < 0.001$
- value proximity: $\chi^2 = 55.258$, $p < 0.001$
- relational proximity**:** $\chi^2 = 79.842$, $p < 0.001$

These results indicate that at least one age group differs significantly from the others in each proximity dimension. The increasing chi-square values from geographic to relational proximity suggest that age-related differences become more pronounced as we move from physical to social-emotional aspects of local food perception.

Post-hoc Dunn tests with Bonferroni correction identified specific pairwise differences. For **geographic proximity**, significant differences emerged between 18–29 vs. 40–59 years ($p = 0.0002$), 18–29 vs. 60+ years ($p < 0.0001$), and 18–29 vs. 30–39 years ($p = 0.0434$). For **value proximity**, the 60+ group differed significantly from all younger groups: 18–29 vs. 60+ ($p < 0.0001$), 30–39 vs. 60+ ($p < 0.0001$), and 40–59 vs. 60+ ($p < 0.0001$). **Relational proximity** showed the most comprehensive differences, with significant contrasts between all age group pairs except within the youngest cohorts.

Supplementary ANOVA analyses yielded consistent findings:

- Geographic proximity: $F(3, 740) = 4.61$, $p = 0.003$
- Value proximity: $F(3, 740) = 17.11$, $p < 0.001$
- Relational proximity: $F(3, 740) = 21.59$, $p < 0.001$

Effect sizes were calculated using eta-squared ($\eta^2$) and omega-squared ($\omega^2$) measures.

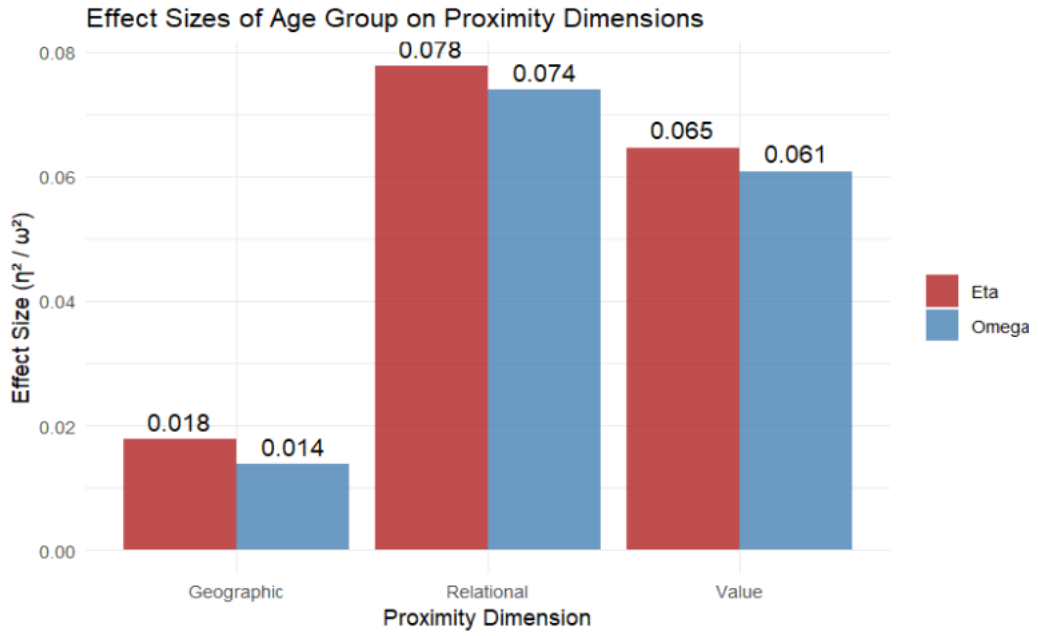


*Figure 14 Effect sizes ($\eta^2$ and $\omega^2$) of age group on proximity dimensions*

Source*: Self-edited figure using effectsize, ggplot2, dplyr and tidyr packages in R.*

Geographic proximity showed small effects ($\eta^2 = 0.018$, $\omega^2 = 0.014$), value proximity demonstrated moderate effects ($\eta^2 = 0.065$, $\omega^2 = 0.061$), and relational proximity exhibited moderate-to-large effects ($\eta^2 = 0.078$, $\omega^2 = 0.074$). The figure above illustrates these effect sizes across the three proximity dimensions.

**Tukey HSD tests** identified homogeneous subgroup structures. For geographic proximity, the 60+ and 40–59 age groups formed one subset, while the 18–29 group represented a distinct lower subset. Value proximity showed clear division with the 60+ group forming an upper subset and all other groups comprising a lower subset. Relational proximity demonstrated a hierarchical pattern: 60+ group (subset "a"), 40–59 group (subset "b"), and the two youngest groups forming the lowest subset ("c"). Figure 15 presents these homogeneous subsets based on mean proximity scores.

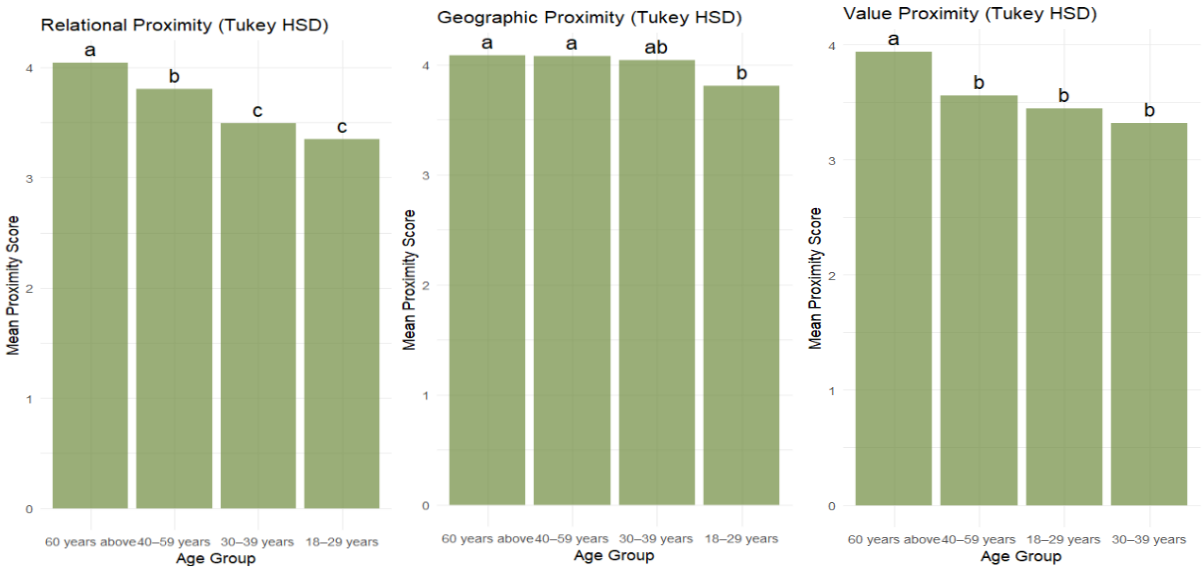


*Figure 15 Bar charts, homogeneous subsets of age groups based on Tukey HSD post-hoc test across proximity dimensions (geographic, value, relational)*

Source*: Self-edited figure using agricolae, ggplot2 packages in R.*

Both parametric and non-parametric approaches yielded consistent findings, strengthening confidence in the results. The non-parametric tests confirmed overall group differences, while parametric post-hoc analyses provided detailed subgroup patterns. Key convergent findings include universal significance across all proximity dimensions, consistent youngest vs. oldest group contrasts, and clear age-related gradients, particularly in relational proximity.

**Hypothesis H3.1 is supported.** The evidence for accepting this hypothesis comes from multiple sources of statistical analysis. The Kruskal-Wallis tests provided statistically significant results across all three proximity dimensions (geographic: $\chi^2 = 22.106$, $p < 0.001$; value: $\chi^2 = 55.258$, $p < 0.001$; relational: $\chi^2 = 79.842$, $p < 0.001$), demonstrating that at least one age group differs significantly from others in each proximity measure. These findings were strengthened by supplementary ANOVA analyses, which yielded consistent significant results, indicating the robustness of the age-related patterns.

The post-hoc Dunn tests further substantiated the hypothesis by identifying specific pairwise contrasts, particularly between the youngest and oldest age groups, with multiple significant differences emerging across all proximity dimensions. Additionally, the Tukey HSD post-hoc analyses revealed clear homogeneous subgroup patterns that support age-related segmentation, showing distinct groupings with older consumers consistently forming higher-scoring subsets. The effect size analyses provided evidence of practical significance beyond statistical significance, with relational proximity showing moderate-to-large effects ($\eta^2 = 0.078$, $\omega^2 = 0.074$) and value proximity demonstrating moderate effects ($\eta^2 = 0.065$, $\omega^2 = 0.061$). The consistency of results across both parametric and non-parametric analytical approaches, strengthens confidence in the findings and provides triangulated evidence for age-related variation in local food proximity perceptions.

Thesis: Consumers' perception of local food proximity varies significantly across age groups, with older individuals reporting higher levels of geographic, value-based, and especially relational proximity. This suggests that age plays a crucial role in shaping how individuals connect with local food, with the oldest age group (60+) consistently demonstrating the strongest perceived ties and the youngest cohort (18–29) showing the weakest connections across all proximity dimensions.

## 6.3 Examining H3.2

**H3.2:** Consumers' perception of local food differs between genders.

In order to examine Hypothesis 3.2 non-parametric techniques were applied, as the proximity variables did not follow a normal distribution (based on Shapiro–Wilk tests, $p < 0.001$ for all dimensions), the analysis was conducted using distribution-free methods appropriate for non-normal or ordinal data. Wilcoxon rank-sum tests were used to determine **whether perceived proximity scores differ** significantly between men and women across the three conceptual proximity dimensions. These tests assess whether the distributions of the two groups differ in terms of central tendency without relying on assumptions of normality. To complement the significance testing, Cliff's Delta was calculated for each proximity dimension to **evaluate the magnitude of gender-based differences**. Cliff's Delta estimates the probability that a randomly selected woman reports a higher proximity score than a randomly selected man. Also, descriptive statistics were used to characterize the proximity scores by gender. To visualise the results, a comparative boxplot was generated to illustrate the gender-based distribution patterns and highlight the consistency of observed differences across proximity dimensions.

**Group differences by gender: Wilcoxon tests and effect sizes**

To assess gender-based differences in the perception of local food proximity, two non-parametric methods were applied. The Wilcoxon rank-sum test was used to test for statistically significant differences in proximity scores between men and women, without assuming normal distribution. To evaluate the magnitude of these differences, Cliff's Delta was calculated as a robust non-parametric effect size measure.

*Table 18 Wilcoxon test results and Cliff's Delta effect sizes for gender-based differences in perceived proximity*

| ***Proximity Dimension*** | ***Wilcoxon p-value*** | ***Cliff's δ*** | ***95% CI*** | ***Effect Size*** |
|---|---|---|---|---|
| *Geographic* | < 0.001 | 0.165 | 0.084–0.245 | Small |
| *Relational* | < 0.001 | 0.151 | 0.069–0.231 | Small |
| *Value* | < 0.001 | 0.149 | 0.067–0.229 | Small |

Source*: Self-edited table based on own calculation : Wilcoxon rank-sum tests (stats package) and Cliff's Delta (effsize package) in R.*

The Wilcoxon rank-sum tests indicated **statistically significant differences** between men and women across all three proximity dimensions. Specifically, women reported higher proximity scores than men in each case. The test statistics and p-values were as follows: for geographic

proximity, $W = 83{,}810$, $p < 0.001$; for relational proximity, $W = 82{,}781$, $p < 0.001$; and for value proximity, $W = 82{,}617$, $p < 0.001$.

Cliff's Delta revealed **small but statistically meaningful effect sizes**. For geographic proximity, δ = 0.165 (95% CI: 0.084–0.245); for relational proximity, δ = 0.151 (95% CI: 0.069–0.231); and for value proximity, δ = 0.149 (95% CI: 0.067–0.229). All values fall within the "small" effect size range and their confidence intervals exclude zero, confirming the **consistency** of gender differences across all dimensions.

**Descriptive statistics by gender**

To contextualize the test results, descriptive statistics were calculated for each proximity dimension by gender.

*Table 19 Median and interquartile range of proximity dimensions by gender*

| Proximity Dimension | Gender | Median | Q1 | Q3 |
|---|---|---|---|---|
| **Geographic** | Woman | 4.33 | 3.67 | 4.67 |
| | Man | 4.00 | 3.50 | 4.50 |
| **Relational** | Woman | 4.00 | 3.20 | 4.60 |
| | Man | 3.60 | 3.00 | 4.40 |
| **Value** | Woman | 3.86 | 3.14 | 4.43 |
| | Man | 3.57 | 3.00 | 4.14 |

Source*: Self-edited table, own calculation based on survey data.*

As shown in the table above, women consistently report higher median scores across all three dimensions of proximity. For geographic proximity, the median score was 4.33 for women compared to 4.00 for men; for relational proximity, the difference was even more pronounced (4.00 vs. 3.60); and for value proximity, women again scored higher (3.86 vs. 3.57). These differences in central tendency are supported by similar interquartile ranges (Q1–Q3) within each group, indicating comparable variability in responses. The observed pattern suggests that while both genders make use of the full response scale, **women's responses are systematically shifted toward higher proximity ratings**. The median differences (ranging from 0.29 to 0.40 points) align with the small effect sizes reported in the Cliff's Delta analysis and further show the interpretation that gender plays a consistent, but modest role in shaping perceptions of proximity to local food.

**Boxplot visualisation of gender differences**

The differences observed in proximity perceptions between men and women were also visualized using a combined boxplot. Figure 16 displays the distribution of proximity scores across gender groups for all three proximity dimensions. In each boxplot, the horizontal line inside the box represents the median, while the black dot indicates the group mean. The top and bottom of each box mark the upper (Q3) and lower quartiles (Q1), respectively, representing the middle 50% of the data. The whiskers extend to 1.5 times the interquartile range, and individual points beyond this range are plotted as outliers.

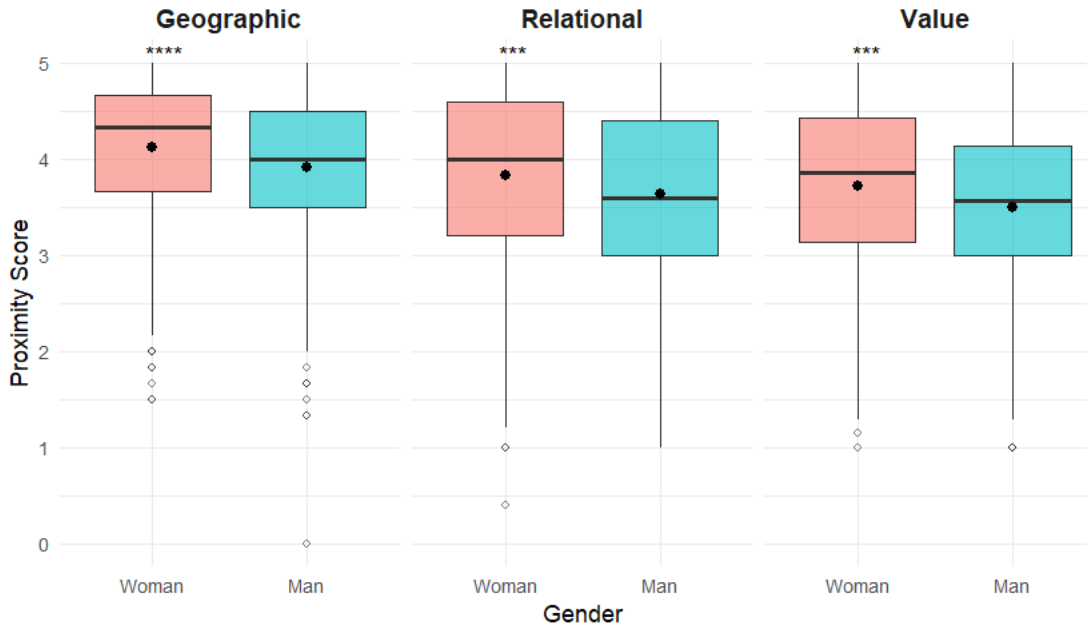


*Figure 16 Gender differences in perceived proximity dimensions of local food*

Source*: Self-edited figure in R using packages: ggplot2, ggpubr, dplyr, tidyr.*

Across all three proximity dimensions, women consistently show higher medians and means than men. The geographic proximity dimension shows the largest absolute difference, but the pattern is uniform: the entire distribution for women is shifted upward relative to men. Although the interquartile ranges overlap, the consistent elevation in central tendency supports the results of the Wilcoxon and effect size analyses. Asterisks above the plots indicate the level of statistical significance based on Wilcoxon rank-sum tests (**$p < 0.001$; ***$p < 0.0001$). These visual patterns reinforce the earlier conclusion that women perceive local food as more proximate than men across all three conceptual domains.

**Hypothesis evaluation**

Based on the results of the Wilcoxon rank-sum tests, Cliff's Delta effect size estimates, descriptive statistics, and visual inspection of proximity distributions, **Hypothesis 3.2 is supported**. Statistically significant gender differences were found across all three proximity dimensions ($p < 0.001$ in all cases), with women consistently reporting higher perceived proximity than men. Although the effect sizes were classified as small, their consistency across dimensions and the exclusion of zero in all confidence intervals indicate that the gender effect is robust and reliable.

Thesis: Gender plays a substantial role in shaping consumer perceptions of local food. Women consistently report a stronger sense of geographic, relational, and value-based proximity compared to men.

## 6.4 Examining H3.3

**H3.3:** Consumers' perception of local food varies based on income levels.

To examine Hypothesis 3.3, I have combined non-parametric and regression-based analyses. Income was measured on a five-point ordinal scale, ranging from "very tight" to "significantly above average," and subsequently recoded into **three ordered categories**: below average, average, and above average. This grouping ensured more balanced group sizes while maintaining the variable's ordinal structure. Given the non-normal distribution of the proximity variables, Kruskal–Wallis rank-sum tests were applied to assess **whether perceived proximity scores differ significantly across income groups**. Where significant overall differences were observed, Dunn's post-hoc tests with Bonferroni correction were used to **identify specific group-level contrasts**. These calculations are complemented by a quantile regression analysis, to see the **effect of income** on each proximity dimension. A combined boxplot was created to visualize the distribution of proximity scores across income groups for all three proximity types.

### Kruskal–Wallis and Dunn test

To examine whether perceptions of proximity differ across income groups, non-parametric Kruskal–Wallis rank-sum tests were conducted for each proximity dimension. Income was treated as an ordinal variable with three categories: below average (n=91), average (n=471), and above average (n=205).

*Table 20 Kruskal–Wallis test and Dunn post-hoc results for income group differences in perceived proximity*

| ***Proximity*** | ***KW $\chi^2$(df)*** | ***p-value*** | ***Dunn post-hoc comparison*** |
|---|---|---|---|
| ***Geographic*** | 12.25 (2) | 0.0022 | Below avg vs. Avg (**p = 0.0008**),<br>Below avg vs. Above avg (*p = 0.0281*) |
| ***Value*** | 13.43 (2) | 0.0012 | Below avg vs. Above avg (**p = 0.0019**),<br>Avg vs. Above avg (**p = 0.0034**) |
| ***Relational*** | 5.93 (2) | 0.0514 | Avg vs. Above avg (*p = 0.0326*) – **marginal** |

Source*: Self-edited table based on own calculation: Kruskal–Wallis test (stats) and Dunn post-hoc test (dunn.test) in R.*

The results revealed statistically significant differences across income groups for geographic proximity ($\chi^2(2) = 12.25$, $p = 0.0022$) and value proximity ($\chi^2(2) = 13.43$, $p = 0.0012$). For relational proximity, the test yielded borderline significance ($\chi^2(2) = 5.93$, $p = 0.0514$), suggesting a weaker association with income.

To further explore these differences, post-hoc comparisons were conducted using Dunn's test with Bonferroni correction. In the case of geographic proximity, individuals in the below

average income group reported significantly higher proximity scores than those in both the average ($p$ = 0.0008) and above average ($p$ = 0.0281) groups, while no significant difference was observed between the average and above average groups. For value proximity, the above average income group differed significantly from both the average ($p$ = 0.0034) and below average ($p$ = 0.0019) groups. No significant difference was found between the average and below average categories. In the case of relational proximity, one marginally significant contrast emerged between the average and above average groups ($p$ = 0.0326), but this did not reach the Bonferroni-adjusted threshold, and no other pairwise differences were significant. These results suggest that **income influences perceived geographic and value proximity**, while **relational proximity appears largely unaffected by income level**.

**Quantile regression results across income levels**

To examine the association between perceived proximity dimensions and income, quantile regression models were applied at the median level (τ = 0.5). This allows for a more nuanced analysis compared to mean-based linear regression, given the ordinal structure of the income variable and the non-normal distribution of proximity scores.

*Table 21 Quantile regression results (τ = 0.5) for the effect of income on perceived proximity*

| Proximity | β Coeff. | 95% CI | Sig.? | Explanation |
|---|---|---|---|---|
| **Geographic** | 0.167 | [–0.71, 0.17] | No | Weak positive trend, not significant |
| **Value** | –0.143 | [–0.61, –0.14] | Yes | Significant negative effect |
| **Relational** | –0.300 | [–0.30, 0.66] | No | No meaningful effect |

Source*: Self-edited table based on own calculation: quantile regression using the quantreg package in R.*

At the 0.5 quantile, **value proximity** showed a **significant negative relationship** with income level (β = –0.143; 95% CI: [–0.58, –0.14]), suggesting that individuals in higher income groups tend to perceive lower value-based proximity toward local food products. This result is consistent with previous non-parametric tests and post-hoc comparisons.

For **geographic proximity**, the regression coefficient was positive (β = 0.167), but the 95% confidence interval included zero ([–0.72, 0.17]), indicating **no statistically significant effect** at the median level. While the direction of association aligns with Kruskal–Wallis results—where higher-income groups reported slightly higher scores—this inconsistency may be due to the skewed distribution and unequal group sizes.

In the case of **relational proximity**, the median-level coefficient was also negative (β = –0.200), but its confidence interval ([–0.81, 0.81]) again included zero, confirming the **absence of a significant association** between income and social connection-related proximity.

These findings highlight the **unique sensitivity of value-based proximity to income differences**, while geographic and relational proximity dimensions appear more stable across socioeconomic groups. The quantile regression results support and refines the conclusions from the non-parametric analysis, offering robust evidence that income plays a selective role in shaping consumer perception.

**Boxplot visualization of income-related proximity differences**

To visually support the statistical findings, Figure 17 below displays boxplots for the three proximity dimensions across the three income categories (below average, average, and above average). Each boxplot illustrates the median (thick line), interquartile range (box), and the mean (black dot) of perceived proximity scores.

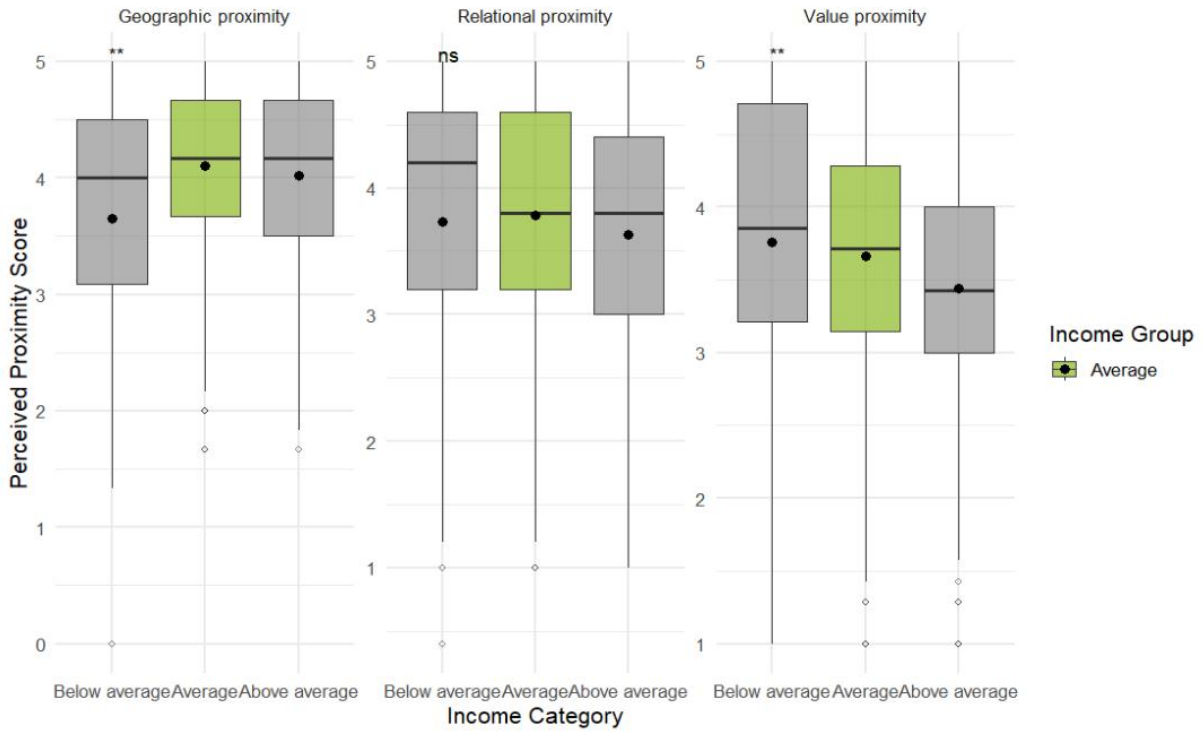


*Figure 17 Effect of income on local food perception across three proximity types (boxplot)*

Source*: Self-edited figure using R with the ggplot2, dplyr, tidyr, and ggpubr packages.*

For geographic proximity, consumers in the below average income group reported the highest median scores, suggesting a stronger spatial attachment to local food compared to their higher-

income counterparts. The post hoc tests confirmed that this group differed significantly from both the average and above average income categories (**$p < 0.01$**), as marked with double asterisks in the plot.

For relational proximity, **no statistically significant differences** were observed between income categories, as also indicated by the "ns" (not significant) label. The boxplots show relatively similar median and mean values across all income groups, supporting the statistical results from the Kruskal–Wallis and quantile regression analyses.

For value proximity, the below average income group again demonstrated higher perceived scores than the above average group. The observed difference was statistically significant (**$p < 0.01$**), suggesting that lower-income consumers may place greater importance on product-related attributes and value perceptions.

**Hypothesis assessment**

The results of both the non-parametric tests and the quantile regression analysis provide evidence that **consumers' perception of local food varies based on income levels**, but not uniformly across all proximity dimensions. Value proximity was the **most sensitive** to income differences. Both the Kruskal–Wallis test and the quantile regression confirmed significant disparities, particularly between the below average and above average income groups. This suggests that value-based aspects of local food are more salient to lower-income consumers. Geographic proximity also showed statistically significant differences in the Kruskal–Wallis test, with lower-income consumers reporting stronger perceived spatial closeness to local food. However, this effect was not confirmed in the quantile regression, where the confidence interval included zero, indicating a **less stable association**. Relational proximity **did not exhibit statistically robust differences** in either analysis, implying that relational perceptions of local food are less influenced by income level.

These results **partially confirm Hypothesis 3.3**. While income level does influence consumer perceptions of local food, the **effect is dimension specific**. Value-based proximity is the most clearly affected, followed by a weaker pattern in geographic proximity, and minimal impact on relational proximity.

Thesis: Income shapes how consumers perceive geographic and value proximity of local food, with lower-income groups reporting stronger spatial ties and greater importance on perceived value. Relational proximity remains stable across income groups, suggesting that relational closeness to local food is independent of financial status.

## 6.5 Examining H4.1

**RQ4**: How does the perception of local food relate to consumers' willingness to pay and purchase frequency?

**H4.1:** Value proximity, relational proximity, and geographic proximity have an effect on consumers' willingness to pay for local food.

To test Hypothesis H4.1, I have started with a preliminary diagnostic, that revealed a positively skewed distribution of WTP values with several extreme observations. To minimize their influence, outliers were excluded based on the 90th percentile plus 1.5 times the interquartile range (IQR), resulting in the removal of eight observations with unusually high WTP percentages (e.g., 125%, 2000%).

The Shapiro–Wilk test indicated a significant deviation from normality ($W = 0.936$, $p < 0.001$), and the Breusch–Pagan test detected heteroskedasticity ($p = 0.005$), suggesting that variance of residuals varied across levels of the predictors. Given the non-normal distribution of residuals and the presence of heteroskedasticity, quantile regression was selected as the primary analytical method, this provides robust parameter estimates across the distribution of the dependent variable and is well suited for skewed outcomes and unequal error variances. Models were estimated at the 25th, median, and 75th percentiles to examine **how proximity dimensions influence WTP** across different levels of consumer willingness.

### Distribution of WTP

The distribution of willingness to pay for local food revealed a strongly right-skewed pattern, as visualized in the histogram below.

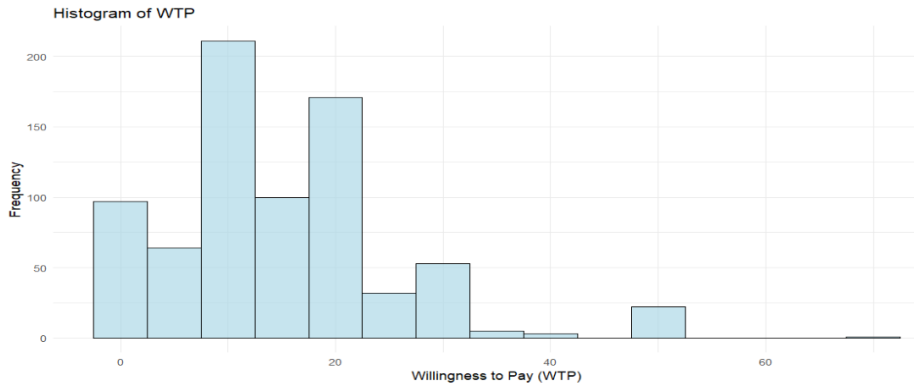


*Figure 18 Distribution of consumers' willingness to pay (WTP) for local food (histogram)*

Source*: Self-edited figure using R (ggplot2 package)*

Most respondents reported relatively low WTP values, with a substantial number indicating a willingness to pay of 10% or less. Only a minority expressed high WTP values, contributing to a long upper tail in the distribution. This skewed distribution violates the assumptions of normality required for linear regression. The Shapiro–Wilk test confirmed this with a highly significant result ($W = 0.936$, $p < 0.001$), and heteroskedasticity was also detected (Breusch–Pagan test: $BP = 12.73$, $df = 3$, $p = 0.0053$). Given these violations, quantile regression was deemed a more appropriate method, as it does not rely on normality assumptions and can reveal how predictors affect different segments of the WTP distribution.

To further support this decision, respondents were grouped into four segments based on WTP percentiles. As shown in the table below, more than 47% of participants reported a willingness to pay of 10% or less, while only 15% exceeded 20%.

*Table 22 WTP quantile-based distribution of responses (n = 759)*

| ***Quantile*** | ***WTP range (%)*** | ***Number of respondents*** |
|---|---|---|
| *≤ 25th percentile* | ≤ 10% | 358 |
| *25th–50th percentile* | 11–15% | 106 |
| *50th–75th percentile* | 16–20% | 178 |
| *> 75th percentile* | > 20% | 117 |

Source*: Self-edited summary based on percentiles of WTP variable*

These findings support the use of quantile regression, which provides a more nuanced understanding of the relationship between proximity and willingness to pay across consumer segments with varying WTP levels.

**Quantile regression results**

*Table 23 Quantile regression coefficients for WTP and proximities*

| *Quantile* | *Variable* | *Coefficient* | *Lower Bound* | *Upper Bound* |
|---|---|---|---|---|
| *0.25* | Geographic proximity | 1.3636 | 0.9376 | 2.2528 |
| *0.5* | | 1.7647 | 0.3389 | 2.6984 |
| *0.75* | | 1.2632 | -0.9002 | 1.9443 |
| *0.25* | Relational proximity | 1.0331 | -0.0694 | 1.9751 |
| *0.5* | | 1.2255 | 0.3233 | 2.4070 |
| *0.75* | | 0.8553 | -0.0411 | 1.9898 |
| *0.25* | Value proximity | 1.3017 | 0.3779 | 2.2637 |
| *0.5* | | 2.05882 | 0.9982 | 2.8313 |
| *0.75* | | 2.5790 | 1.2735 | 3.3802 |
| *0.25* | Intercept | -6.1157 | -8.3007 | -4.3768 |
| *0.5* | | -5.1471 | -7.8733 | -1.3376 |
| *0.75* | | 2.1974 | -0.9523 | 11.1022 |

Source: *Self-edited table*

Quantile regression models were estimated at the 25th, 50th, and 75th percentiles to explore how perceived proximity dimensions influence consumers' willingness to pay (WTP) for local food across different levels of the WTP distribution. The table below summarizes the estimated coefficients and 95% confidence intervals for all three proximity dimensions.

The results indicate that **value proximity exerts the strongest and most consistent influence** on WTP. Its effect increases across the distribution, with a significant and substantial coefficient at the 75th percentile (β = 2.58; 95% CI: [1.27, 3.38]), suggesting that consumers with higher willingness to pay are particularly influenced by perceived product value and related attributes.

**Geographic proximity also shows a statistically significant effect, especially around the median** (β = 1.76; 95% CI: [0.34, 2.70]). However, the strength of this relationship weakens at the upper end of the distribution (β = 1.26 at τ = 0.75, not significant), indicating that geographic proximity is more relevant for moderate rather than high WTP levels. The influence of **relational proximity is comparatively weaker and less stable**. While coefficients are positive across all quantiles, significance is only observed at the median (β = 1.23; 95% CI: [0.32, 2.41]), with confidence intervals including zero at other quantiles. These patterns are visually summarized in the Figure 19 below, which plots the quantile regression coefficients across the three proximity dimensions.

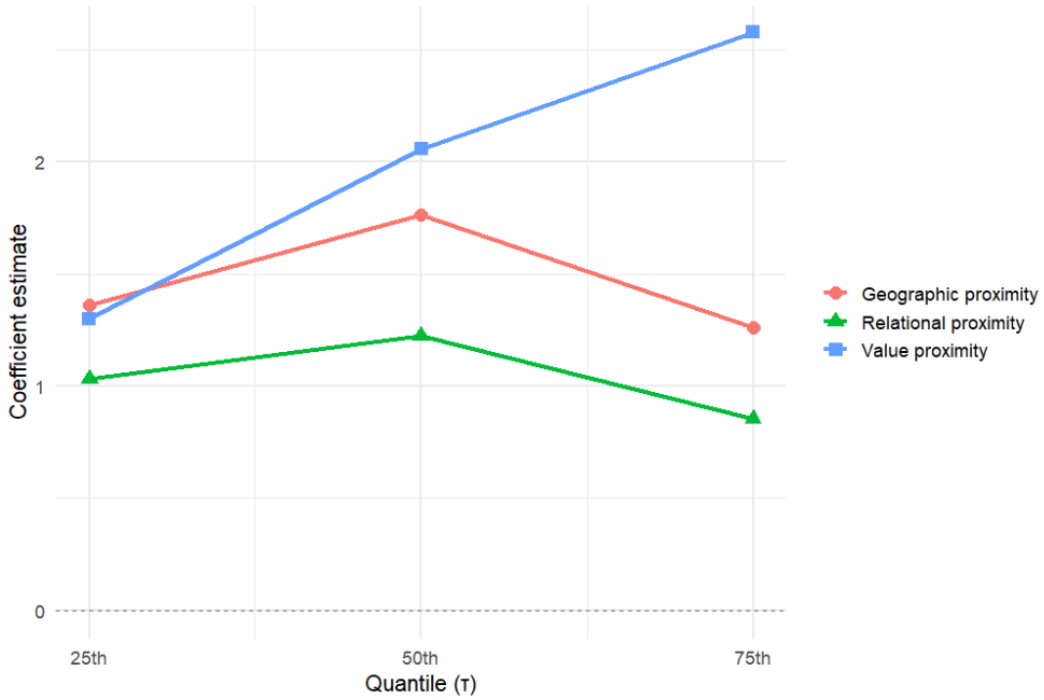


*Figure 19 Quantile regression coefficients for value, relational, and geographic proximity*

Source*: Self-edited figure using R (quantreg and ggplot2 packages)*

The figure clearly shows the increasing dominance of value proximity toward the upper end of the WTP distribution. Geographic proximity peaks around the median, while relational proximity remains comparatively flat. These confirm that perceived **proximities contribute unequally to WTP**, and their impact varies across segments. Value-based perceptions are especially influential among those willing to pay more, while geographic considerations are more salient for average consumers.

**Evaluation of H4.1**

The results consistently support H4.1, which posited that value, relational, and geographic proximity influence consumers' willingness to pay for local food. The quantile regression results revealed that **value-based proximity has the strongest and most consistent effect on willingness to pay, particularly among consumers with higher WTP**. Geographic proximity showed a moderate but significant influence, especially at the median level, suggesting that **spatial closeness remains an important but less decisive factor** in shaping consumer willingness to pay. In contrast, relational proximity demonstrated a weaker and more inconsistent effect across quantiles. Given these, **the hypothesis can be accepted in full**, with empirical evidence supporting the effect of all three proximity dimensions, although with differing magnitudes. The differentiated influence observed across quantiles confirms the added value of quantile regression in capturing heterogeneity in WTP and highlights the multidimensional nature of consumer motivations when it comes to supporting local food systems.

Thesis: Consumers' willingness to pay for local food is shaped by all three proximity dimensions. Value-based proximity emerges as the strongest and most consistent determinant, particularly among high-WTP consumers. Geographic proximity plays a moderate role, especially at lower and median WTP levels, but its influence diminishes among those willing to pay more. Relational proximity shows a weak yet relatively stable effect.

## 6.6 Examining H4.2

**H4.2:** Value proximity, relational proximity, and geographic proximity have an effect on consumers' purchase frequency of local food.

To investigate Hypothesis H4.2, I used machine learning and statistical modeling to assess whether perceived proximity dimensions influence how often consumers purchase local food. The purchase frequency was initially recorded as the annual number of purchases and later recoded into broader categories. The rationale for applying multiple methods lies in the complexity of the behavioral outcome and the expectation that different proximity types may exert distinct and potentially nonlinear effects. A random forest classifier was first used to explore the **relative predictive importance of the proximity dimensions**. This was followed by a multinomial logistic regression, which allowed for understanding the strength and significance of **associations between proximity perceptions and purchasing behaviour**.

### Random forest

To explore the predictive power of proximity dimensions on consumers' purchase frequency, three random forest models were calculated. The first model included all three proximity variables—geographic, relational, and value proximity. The second excluded the relational proximity dimension based on its low importance. The third and simplest model relied solely on geographic proximity.

*Table 24 Random forest model accuracy comparison*

| *Model* | *Proximity* | *Train accuracy* | *Test accuracy* | *OOB error rate* |
|---|---|---|---|---|
| *Model 1* | Geographic | 0.54 | 0.534 | 0.4872 |
| *Model 2* | Geographic and value | 0.683 | 0.489 | 0.5385 |
| *Model 3* | All | 0.808 | 0.489 | 0.5311 |

Source*: Self-edited table based on randomForest package in R.*

*Table 25 Boruta feature importance results*

| *Variable* | *Mean importance* | *Median importance* | *Min importance* | *Max importance* | *Normalized hits* | *Decision* |
|---|---|---|---|---|---|---|
| *Geographic proximity* | 8.24 | 7.36 | 5.71 | 12.26 | 1 | Confirmed |
| *Relational proximity* | -1.25 | -1.27 | -3.9 | 3.05 | 0.05 | Rejected |
| *Value proximity* | 4.59 | 4.47 | 1.86 | 8.08 | 0.84 | Confirmed |

Source*: Self-edited table based on output of the Boruta package in R.*

The full model, which included all three proximity dimensions, achieved a high training accuracy of 80.8%, but the test accuracy dropped to 48.9%, indicating overfitting. According to the Boruta feature selection algorithm, **only geographic and value proximity were retained as important predictors**, while relational proximity was rejected as less informative than random noise variables. The importance scores showed that geographic had the strongest influence (mean importance = 8.24), followed by value (mean importance = 4.59). Relational, in contrast, had a negative importance score (–1.25), with a normalized hit rate of only 5.3%. To reduce model complexity and address overfitting, relational proximity was excluded in the second model. As a result, training accuracy decreased to 68.3%, but the test accuracy remained stable at 48.9%, indicating improved generalizability. The gap between train and test performance narrowed from 31.9% to 19.4%, suggesting reduced variance and a better bias-variance balance.

The third model, which included only geographic proximity, showed the most stable but least accurate results: training accuracy was 54.0%, and test accuracy was 53.4%, with a minimal gap of 0.6%. The out-of-bag (OOB) error rate also aligned more closely with the test error, showing that the model generalized well despite its simplicity. Although this model performed modestly in terms of classification, its stability supports the conclusion that geographic proximity alone is a reasonably strong predictor of purchase frequency.

The random forest results demonstrate that geographic proximity plays the most decisive role in predicting consumer behaviour related to local food purchases. Value proximity contributes modestly but meaningfully, while relational proximity appears to have minimal impact in this specific behavioural outcome.

**Multinomial logistic regression results**

To assess how the three proximity dimensions influence consumers' purchase frequency, multinomial logistic regression was applied. The outcome variable was recoded into four categories—rarely, monthly, weekly, and daily—and the model compared each category against the reference group of rare purchasers. This method was chosen due to the violation of the proportional odds assumption, as indicated by the Brant test ($\chi^2 = 28.33$, df = 15, $p = 0.02$), which ruled out the use of ordinal logistic regression. The results are summarized in the table below, presenting the regression coefficients, odds ratios, z-values, and p-values for each proximity variable across all outcome levels.

*Table 26 Multinomial logistic regression summary*

| *Outcome* | *Predictor* | *Coefficient* | *Odds ratio* | *p-value* | *Significance* |
|---|---|---|---|---|---|
| *Monthly* | Geographic | 0.198 | 1.22 | 0.31 | Not sig. |
| *N=236* | Relational | 0.027 | 1.03 | 0.893 | Not sig. |
| | Value | 0.251 | 1.29 | 0.186 | Not sig. |
| *Weekly* | Geographic | 0.615 | 1.85 | 0.002 | Significant |
| *N=387* | Relational | 0.008 | 1.01 | 0.967 | Not sig. |
| | Value | 0.518 | 1.68 | 0.006 | Significant |
| *Daily* | Geographic | 0.033 | 1.03 | 0.894 | Not sig. |
| *N=71* | Relational | 0.586 | 1.8 | 0.028 | Significant |
| | Value | 0.519 | 1.68 | 0.037 | Significant |

Source*: Self-edited table based on nnet::multinom() output in R.*

The model revealed distinct patterns across the different proximity dimensions. **Value proximity emerged as the most consistent and significant predictor**. It increased the likelihood of both weekly (OR = 1.68, p = 0.006) and daily (OR = 1.68, p = 0.037) purchases compared to the rare group. Geographic proximity showed a significant effect only for weekly purchasing (OR = 1.85, p = 0.002), indicating that physical closeness is a relevant factor for consumers who shop regularly but not necessarily for those at either end of the frequency spectrum. Relational proximity showed no significant influence in most comparisons, except for a weak effect for daily purchases (OR = 1.80, p = 0.028), suggesting a limited role in explaining high-frequency behaviour.

The model met all required assumptions for multinomial logistic regression: the outcome variable was categorical with sufficient cases in each category, predictors showed no multicollinearity (VIF < 2.1), and the data structure supported independent observations.

Value proximity proved to be the most stable driver of increased purchase frequency. Geographic proximity had a moderate but specific effect, and relational proximity, although mostly insignificant, may play a secondary role among the most engaged consumers.

**Evaluation of H4.2**

To evaluate Hypothesis H4.2, two complementary methods were applied: random forest classification and multinomial logistic regression. These approaches jointly capture both predictive relevance and statistical significance. The random forest analysis highlighted **geographic proximity as the most important predictor** of purchase frequency, with the highest mean importance score. Value proximity also showed substantial predictive power, while **relational proximity was deemed unimportant** and rejected by the Boruta variable

selection method. However, the model exhibited overfitting, especially in the case of infrequent buyer categories.

In contrast, according to the multinomial logistic regression showed **value proximity** as a significant positive predictor for both weekly and daily purchases. **Geographic proximity was a significant factor only for weekly purchases (the most common category)**, and relational proximity had a weak but statistically significant effect only for daily buyers. While the random forest analysis highlighted geographic proximity as the most influential predictors of purchase frequency, the multinomial regression revealed additional, level-specific effects—such as the significance of relational proximity for daily purchases. These differences are not contradictory but reflect the complementary strengths of the two approaches: random forest captures overall predictive power, whereas multinomial regression provides more detailed insights into the effect of proximity dimensions across different purchase levels. **While geographic proximity facilitates routine access to local food, value proximity fosters habitual engagement among frequent consumers.**

Taken together, based on the evidence **H4.2 is partially accepted**. Both analytic methods confirm that **value and geographic proximity** shape consumers' purchase frequency. However, **relational proximity** demonstrates inconsistent and marginal effects.

Thesis: Consumers' purchasing frequency of local food is primarily influenced by perceived value and geographic proximity, while relational proximity has only a limited impact.

### 6.6.1 Summary of the examination of hypotheses and research questions

*Table 27 Summary of the examination of hypotheses*

| Hypothesis | | Justification | Thesis statement |
|---|---|---|---|
| *H2.1: Hungarian consumers perceive local food through multiple proximity dimensions, including relational and value proximity alongside geographic proximity.* | Accepted | Confirmed by NDA, scree plot, and EFA with Promax rotation. Three distinct but correlated factors identified: value, relational, and geographic proximity. CFA supported three-factor model over one-factor. Reliability, discriminant and convergent validity confirmed. | Hungarian consumers perceive local food through a multidimensional framework of proximity, shaped by three distinct but interconnected dimensions: geographic, relational, and value-based proximity. These proximity types are empirically distinguishable yet conceptually interrelated, and they jointly influence how consumers interpret the concept of local food. **Consumer understanding of locality is therefore inherently multidimensional**. |
| *H3.1: Consumers' perception of local food varies across different age groups.* | Accepted | Kruskal–Wallis tests, Dunn post-hoc tests, ANOVA, and Tukey HSD showed significant differences across all three proximity dimensions. Older consumers (60+) consistently showed higher perceived proximity. Effect sizes moderate to large for value and relational proximity. | Consumers' perception of local food proximity varies significantly across age groups, with older individuals reporting higher levels of geographic, value-based, and especially relational proximity. This suggests that **age plays a role in shaping how individuals connect with local food**, with the oldest age group (60+) consistently demonstrating the strongest perceived ties and the youngest cohort (18–29) showing the weakest connections across all proximity dimensions. |
| *H3.2: Consumers' perception of local food differs between genders.* | Accepted | Wilcoxon tests significant ($p < 0.001$) for all proximity dimensions. Cliff's Delta showed small but consistent effect sizes. Women report higher proximity perceptions across all dimensions. | Gender plays a substantial role in shaping consumer perceptions of local food. **Women consistently report a stronger sense of geographic, relational, and value-based proximity** compared to men. |
| *H3.3: Consumers' perception of local food varies based on income levels.* | Partially accepted | Kruskal–Wallis and Dunn tests showed significant differences in geographic and value proximity, not in relational. Quantile regression confirmed only value proximity as significant (negative trend with income). | Income shapes how consumers perceive geographic and value proximity of local food, with lower-income groups reporting stronger spatial ties and greater importance on perceived value. Relational proximity remains stable across income groups, suggesting that **relational closeness to local food is independent of financial status**. |
| *H4.1: Value proximity, relational proximity, and geographic proximity have an effect on consumers' willingness to pay for local food.* | Accepted | Quantile regression shows that value proximity is the strongest and most consistent predictor across WTP quantiles. Geographic proximity is significant at lower/median levels; relational proximity shows weaker but visible effect at the median. | Consumers' willingness to pay for local food is shaped by all proximity dimensions. **Value proximity emerges as the strongest and most consistent determinant, particularly among high-WTP consumers**. Geographic proximity plays a moderate role, especially at lower WTP levels. Relational proximity shows a weak yet relatively stable effect. |
| *H4.2: Value proximity, relational proximity, and geographic proximity have an effect on consumers' purchase frequency of local food.* | Partially accepted | Random forest and Boruta confirmed geographic and value proximity as predictors. Multinomial regression showed value proximity predicts weekly and daily purchases, geographic proximity significant for weekly. Relational proximity has inconsistent overall effect. | Consumers' purchasing frequency of local food is primarily influenced by perceived value and geographic proximity, while relational proximity has only a limited impact. |

Source: *Self-edited table*

### *6.6.2 Answering the research questions*

**RQ1: How do Hungarian consumers define and interpret the concept of local food?**
The study reveals that Hungarian consumers do not define local food based solely on physical distance or administrative boundaries. Instead, their interpretation reflects a **multidimensional understanding** that combines perceived geographic, social, and value proximity. The findings underscore that "local" is not a fixed or purely geographic label, but a **symbolic and value-laden concept** shaped by emotional, cultural, and ethical considerations.

**RQ2: What types of proximity influence Hungarian consumers' perception of local food?**
The results confirm that Hungarian consumers' perception of local food is shaped by three interrelated forms of proximity: geographic, relational, and value based. This **multidimensional structure** was revealed through network-based dimensionality analysis (NDA), validated by exploratory factor analysis (EFA) with both varimax and promax rotations, and **statistically confirmed by confirmatory factor analysis (CFA)**. These findings demonstrate that consumers do not interpret local food solely in terms of physical distance, but also based on emotional, social, and ethical connections.

**RQ3: How do demographic characteristics influence Hungarian consumers' perceived proximity of local food?**
The analysis indicates that some demographic factors (**age, gender, and income**) play an important role in shaping proximity perceptions. Older consumers show stronger perceived relational and value proximity, suggesting that age-related factors influence how consumers relate to local food. Gender-based differences were observed across all three dimensions, with **women** reporting higher proximity perceptions, consistent with their central role in food-related decisions. Income also influences proximity perception, particularly for geographic and value proximity, indicating that **social closeness to local food is independent of financial status.** These findings highlight the need for demographically tailored strategies in both marketing and policymaking.

**RQ4: How does the perception of local food relate to consumers' willingness to pay (WTP) and purchase frequency?**
The results reveal that **value proximity** is the most consistent and strongest predictor of both willingness to pay (WTP) and purchase frequency. Consumers who perceive strong alignment between their values and the characteristics of local food are more willing to pay a premium and to buy these products more frequently. Geographic proximity also influences behaviour but is particularly relevant for consumers with lower WTP levels, indicating that physical accessibility plays a greater role for price-sensitive groups. Relational proximity, while moderately associated with WTP, has a weak and inconsistent effect on purchase frequency. These findings suggest that consumer commitment to local food is driven primarily by shared values and accessibility, while relational aspects play a complementary role, with important implications for segmentation, communication strategies, and policy design.

## 6.7 Limitations of the research

### *Limitations of the methods*

The research applied a combination of statistical methods to analyse consumer perceptions of local food through different proximity dimensions. While these methods provide robust insights, they come with certain limitations. The Kruskal-Wallis test and Dunn's post-hoc comparisons, though useful for non-parametric group comparisons, do not account for interactions between variables and may be sensitive to sample size variations. The Random Forest and Boruta feature selection methods, while effective in identifying important predictors, do not establish causal relationships, only associations. Factor analyses (EFA and CFA) assume linear relationships, which may not fully capture the complexity of consumer perceptions. While quantile regression addressed heteroskedasticity issues in WTP models, it does not fully replace causal inference techniques. To strengthen the validity of findings, methodological triangulation was employed, integrating multiple analytical approaches to cross-validate results and reduce bias. This enhances the robustness of conclusions but does not fully eliminate inherent methodological limitations.

### *Limitations of the dataset*

Despite efforts to create a representative sample, some limitations must be considered. The main limitation is spatial distribution. Although diverse geographic regions were targeted, the dataset is not fully representative of all areas in Hungary, with a higher concentration of participants from Central Hungary. This may have led to underrepresentation from other regions. While the dataset shows diversity in participants' places of residence, the overall geographical spread is not balanced. The use of online and offline questionnaires aimed to address the digital divide, but individuals with limited access to digital tools may still be underrepresented. Sampling biases may also have affected the dataset. Convenience sampling in the initial phase led to a higher proportion of younger participants from Central Hungary, although subsequent targeted sampling helped mitigate age and gender imbalances. Another limitation is the self-reported nature of responses, which could introduce social desirability bias, meaning that sometimes respondents may have provided answers they deemed more socially acceptable rather than their true opinions. Additionally, the cross-sectional design of the study captures consumer perceptions at a single point in time, limiting the ability to track changes over time. Despite these limitations, the dataset provides valuable insights into consumer perceptions of local food and offers a solid foundation for analysis.

# 7 Conclusion and discussion

This chapter discusses the main findings of the dissertation in light of the research questions and hypotheses, linking the empirical results to existing literature. The discussion is structured around key themes: conceptualising local food as a multidimensional construct, consumer preferences, demographic influences, willingness to pay, purchase frequency, and the broader significance of separating proximity dimensions. Given the emphasis on the practical and policy utility of the research, this aspect is addressed separately in the upcoming 8.2 and 8.3 subchapters.

**Local food as a multidimensional construct**

The findings of this dissertation confirm that Hungarian consumers interpret "local food" in a complex way, aligning with Eriksen's (2013) multidimensional proximity framework. Beyond geographic closeness, they emphasise value-based attributes and relational dimensions (RQ1). This aligns with international evidence showing that "local food" has no single universal understanding. While many consumers associate it with geographic distance or administrative borders (Brune et al., 2023; Jensen et al., 2019; Merlino et al., 2022), others stress symbolic meanings such as supporting farmers, higher quality, and community identity (Banerjee and Quinn, 2022; Aprile et al., 2016; Blake et al., 2010). In Hungary, earlier research (Csíkné Mácsai, 2014) focused on distance and direct sales, while recent studies highlight sustainability and cultural values (Nagy-Pető, 2024; Szegedyné Fricz et al., 2020). **My study empirically validated this evolution** by demonstrating that consumer perceptions are well-captured through three distinct proximities: value-based, relational, and geographic.

**Consumer preferences**

The majority of Hungarian consumers in my sample (61.93%) expressed **strong preferences for local food**, consistent with earlier Hungarian results (Szente et al., 2014: 64.4%). Consumers associate local food with freshness, taste, nutritional value, and safety as well (Szegedyné et al., 2020; Kovács et al., 2022). My findings show that preferences are driven by value and relational proximities rather than geography. Consumers emphasised trust in producers and symbolic alignment with values. This mirrors international research demonstrating that perceived quality, authenticity, and social responsibility frequently outweigh geographic definitions in shaping preference (Feldmann and Hamm, 2015; Pícha et al., 2018; Haas et al., 2021).

**Demographic characteristics**

Older consumers reported stronger relational and value proximities, while younger generations (especially Generation Z) displayed weaker ties. Geographic proximity remained stable across age groups. This supports H3.1 (age differences), consistent with findings that **older** adults value health and tradition more strongly (Choe and Kim, 2019; Sengel et al., 2015), while younger consumers prioritise novelty and promotions (Defta et al., 2025). The stability of geographic perceptions across ages may reflect shared cultural definitions of "local."

**Women** consistently scored higher on all three proximities. This confirms H3.2 (gender differences) and aligns with earlier studies linking female consumers to stronger health awareness, ethical concern, and relational orientation (Bellows et al., 2010; Feldmann and Hamm, 2015; Okumus et al., 2021). Although the effect size in my study was small, it was consistent and robust.

Lower-income groups emphasised value and geographic proximities more strongly, reflecting affordability concerns and perceived access barriers. Relational proximity was unaffected by income. This provides partial support for H3.3 (income differences). While some studies report income as a weak or inconsistent predictor (Cranfield et al., 2012; Vuksanović et al., 2017), my findings highlight clear value and geographic effects among lower-income groups.

**Willingness to pay**

In the present study, 88.14% of respondents indicated willingness to pay more for local food, with an average premium of 18%. This is close to Kiss et al.'s (2020) Hungarian figure (20.7%) but below international averages of 30–35% (Mustapa and Kallas, 2025). Women and more educated consumers reported higher premiums, confirming earlier findings (Feldmann and Hamm, 2015; Gracia et al., 2012). These results support H4.1, showing that willingness to pay is strongly shaped by proximity perceptions.

The strongest driver of WTP was value proximity, especially among higher-paying segments. Geographic proximity mattered mainly for moderate WTP groups, while relational proximity played only a supportive role. This supports international evidence that quality, trust, and identity alignment are critical WTP drivers (Feldmann and Hamm, 2015; Hempel and Hamm, 2016). At the same time, my data reinforce the well-documented intention–behaviour gap: while stated WTP is high, actual purchasing is not proven, reflecting barriers such as price and availability (Printezis et al., 2019; Olbrich et al., 2015).

**Purchase frequency**

Self-reported purchase frequency was predominantly influenced by geographic proximity, followed by value proximity, while relational proximity had weak and inconsistent effects. This confirms H4.2, demonstrating that different proximity dimensions shape purchase frequency. **Routine purchasing is shaped more by access** and convenience than by aspirational or symbolic values. This finding echoes previous research: freshness, quality, and safety are important, but availability and convenience often determine whether consumers buy local food regularly (Carfora and Catellani, 2023; Kovács et al., 2022; Birch et al., 2018). Frequent buyers are also more likely to trust producers and identify with community values (Memery et al., 2015; Suhartanto et al., 2023), but barriers such as inconvenience or price sensitivity reduce purchase frequency (Lykins et al., 2025; Birch and Memery, 2020).

Motivations may also vary by how frequently consumers visit local food venues. More frequent shoppers tend to value their relationships with farmers and other customers as well as the locally grown produce, while infrequent shoppers place greater emphasis on convenience, appearance, and price (Bond et al., 2008). This distinction helps explain why relational proximity alone does not guarantee regular purchases but can reinforce loyalty among habitual buyers.

Consumers who perceive strong alignment between their personal values and the characteristics of local food are both more willing to pay a premium and more likely to buy such products frequently. This finding underscores the central role of value proximity in bridging consumer attitudes and actual behaviours.

**The importance of separating proximity dimensions**

My results demonstrate the value of treating perceived value, relational, and geographic proximities as distinct constructs. Value proximity primarily drives symbolic and aspirational behaviour (WTP), geographic proximity governs routine purchases (frequency), and relational proximity enhances trust and loyalty but is insufficient on its own to shift behaviour. This aligns with the growing consensus that geographic proximity alone cannot explain local food preference (Feldmann and Hamm, 2015; Wenzig and Gruchmann, 2018). Instead, multiple drivers such as quality, ethics, and cultural identity shape consumer choices (Skallerud and Wien, 2019; Cappelli et al., 2022). Importantly, **Hungarian evidence also shows how meanings of "local" evolved: in 2014 (Csíkné Mácsai), it was mainly linked to distance, while by 2024 (Nagy-Pető) sustainability and cultural values had become central**, raising questions about how geographical indications and support schemes should be designed.

**Food system transformation**

The proximity framework developed in this dissertation contributes to the broader debate on food system transformation. My findings show that each proximity dimension aligns with transformation objectives. Value proximity supports healthier and more sustainable diets. Geographic proximity enhances resilience by shortening supply chains. Relational proximity fosters trust, inclusiveness, and social capital. This resonates with global frameworks such as the UN Food Systems Summit (United Nations Secretary-General,2023), the EAT-Lancet Commission (Willett et al., 2019), and the EU's Farm to Fork Strategy (European Commission, 2020). While short food supply chains deliver clear economic and social benefits, environmental outcomes are context-dependent (Malak-Rawlikowska et al., 2019; Jarzębowski et al., 2020; Doernberg et al., 2022). Resilience relies on trust and community ties, consistent with my findings on relational proximity (Michel-Villarreal, 2022; Freeman et al., 2023).

*Table 28 Comparison of dissertation results with existing literature*

| ***Hypothesis*** | ***Literature evidence*** | ***Dissertation's findings*** | ***Contribution*** |
|---|---|---|---|
| *H2.1 Multidimensional construct* | "Local food" variably linked to distance, borders, or symbolic values (Brune et al., 2023; Aprile et al., 2016; Eriksen, 2013) | Three proximities validated: value, relational, geographic | Confirms multidimensionality, first empirical validation in Hungary |
| *H3.1 Age differences* | Older adults value health, tradition; younger focus on novelty (Choe and Kim, 2019; Sengel et al., 2015) | Older report higher relational and value proximity; Gen Z weakest ties | Consistent with international findings |
| *H3.2 Gender differences* | Women more health/ethics oriented (Feldmann and Hamm, 2015; Okumus et al., 2021) | Women score higher on all proximities, small but robust effect | Confirms prior evidence in Hungarian context |
| *H3.3 Income differences* | Mixed evidence; income weak predictor (Cranfield et al., 2012) | Lower income = stronger value and geographic; relational stable | Adds nuance: affordability/access dimension |
| *H4.1 WTP* | Value and quality strongest predictors; intention–behaviour gap (Feldmann and Hamm, 2015; Hempel and Hamm, 2016) | 88% willing to pay more; value strongest, geographic moderate, relational weak | Confirms international pattern, quantifies Hungarian premium (18%) |
| *H4.2 Frequency* | Convenience and access critical (Birch et al., 2018); relational trust relevant for loyal buyers (Memery et al., 2015) | Geographic strongest, value also important, relational weak overall but stronger for regular buyers | Extends literature: relational might enhance loyalty but not frequency |

Source: *Self-edited table*

Overall, this dissertation has shown that Hungarian consumers perceive local food through a multidimensional proximity framework comprising value-based, relational, and geographic dimensions. These proximities are influenced by demographics and play differentiated roles in

shaping WTP and purchase frequency. Importantly, the very **definition of "local" is dynamic: earlier linked mainly to distance, it now reflects values such as sustainability and cultural identity**. This evolution underscores the practical and policy relevance of my findings: producers, marketers, and policymakers must move beyond geography and recognise the multidimensionality of local food when designing strategies, supports, and regulatory frameworks. The specific academic, practical, and policy utilities of these findings are therefore discussed in detail in the next 8. Research utility chapter.

# 8 Research utility

This chapter synthesises the main contributions of the dissertation and highlights their relevance for different audiences. The empirical validation of a multidimensional proximity framework generates insights that extend beyond academic debates: it offers practical implications for producers and marketers and provides evidence-based directions for policymakers. Accordingly, the following sections outline the utility of the research for these three segments.

## 8.1 Research utility for academia

### Validating a multidimensional framework of proximity

In this study I aimed to contribute to the academic understanding of local food perception by empirically validating a **multidimensional framework of proximity**. While the concept of local is often associated with merely physical distance, this research demonstrates that consumers' perceptions are also shaped by relational and value proximity (H2.1). These findings support the growing body of literature that argues for a **more complex interpretation of "local,"** yet here I go further by providing empirical evidence.

The study enriches academic discourse by introducing and validating the three latent constructs (geographic, relational, and value proximity) as distinct yet interrelated dimensions. Confirmatory factor analysis verified the superiority of the three-factor model over a one-factor alternative (H2.1), strengthening the argument that local food perception is inherently multidimensional. These findings advance theoretical models that have so far relied primarily on conceptual assumptions or qualitative insights.

### Demographic heterogeneity in proximity perception

The findings provide novel insights into the demographic variation in proximity perception. **Age differentiates at all three dimensions** (H3.1). Older consumers display higher geographic, value and relational proximity to local food, indicating that generational differences are not merely about access or habits, but reflect deeper underlying values and social orientations. This opens important questions for future research, such as whether these perceptions are rooted in **life-stage effects or represent cohort-specific characteristics** that may persist over time. Longitudinal, cross-cultural or qualitative studies could further explore whether younger generations might develop stronger proximity perceptions as they age.

The study also confirms significant **gender-based differences** across all proximity dimensions (H3.2), with women reporting higher scores for all perceived proximities. These findings are consistent with prior literature emphasizing women's central role in household food decisions and their heightened sensitivity to ethical, relational, and environmental food attributes. This supports the need for a gendered lens in food system research and raises questions about how proximity is **socially constructed**.

Regarding income, the research provides nuanced insight into how economic status shapes proximity perception (H3.3). Before, it was only studied how income is in connection with local food preferences and buying behaviour in general. I have found that while geographic and value proximity vary significantly with income, relational proximity remains stable, suggesting that interpersonal ties to producers are less affected by financial status. This challenges assumptions that relational engagement is a luxury afforded only by higher-income consumers and invites further research into the social and cultural foundations of producer–consumer connections.

**Behavioural relevance of proximity**

The behavioural relevance of proximity perceptions is also demonstrated through their relationship to willingness to pay (WTP) and purchase frequency. Value proximity emerged as the strongest and most consistent predictor of WTP (H4.1), while geographic proximity played a role primarily among lower-WTP segments. Relational proximity had a weak and context-dependent/enabling influence. These findings suggest that **value-based perceptions are more central to consumer commitment, particularly in premium segments**. For purchase frequency, both value and geographic proximity are key predictors (H4.2), whereas relational proximity showed inconsistent influence. This suggests that regular engagement with local food is less driven by interpersonal connections (serving more, as an enabler) and more by accessibility and values, an important insight for future behavioural modelling and segmentation approaches.

All three proximity dimensions significantly influence perception and behaviour, but not equally: value proximity plays a central role in both WTP and frequency; geographic proximity is key for accessibility, especially for lower-income groups; and relational proximity mainly supports trust but less so direct behavioural outcomes (RQ2 and RQ4).

**This dissertation delivers a validated three-factor measurement scale of proximity, uncovers an asymmetric behavioural architecture in which value dominates, geographic conditions accessibility, and relational enables, and maps systematic demographic heterogeneity across age, gender, and income.**

## 8.2 Research utility for practitioners

### Multidimensional proximity as marketing foundation

This study shows that consumers do not perceive "local" through a single lens of distance; rather, they evaluate it through three interconnected proximity dimensions (H2.1). This multidimensional architecture supports proximity-profile segmentation and more precise intervention design. In practice, this means **reducing access frictions** where geographic proximity matters most, making **meaningful value cues** salient where value proximity drives choices, and treating trust and **relationships as enabling conditions** rather than standalone drivers of behaviour (H4.1–H4.2).

This logic is also consistent with Construal Level Theory, which argues that people think abstractly about distant issues but concretely about nearby ones (Trope and Liberman, 2010). The frequent gap between consumers' sustainability values and their actual shopping choices can be interpreted through this lens: abstract commitments do not automatically drive concrete behaviour. Local food reduces this gap by providing multiple forms of proximity—geographic, relational, and value-based—that could render sustainability tangible, immediate, and actionable.

### Demographic differentiation for targeting

Proximity perceptions differ systematically by demographic group in ways that have direct marketing consequences. **Women** report higher proximity across all three dimensions (small but consistent effects; H3.2). Given this higher baseline affinity, they represent an important audience for local food, even when the end-user is someone else (e.g., a man or a child). A **dual-layer messaging strategy** could be often effective: the product can be intended for a user group, while also addressing the likely evaluator or purchaser—often women—through verifiable value cues at the point of decision.

Age shows a gradient across the study's bands: **proximity strengthens from younger to older cohorts**, with the 60+ group highest and the 40–59 segment also above the two younger groups (H3.1). Because relational and value proximity are especially stronger among these older segments, narratives that foreground producer identity, craftsmanship, continuity, and credible quality or ethical attributes are likely to resonate more. Income patterns are more nuanced. Lower-income groups in this study report stronger value- and geographic-proximity, while relational proximity is essentially income-invariant (H3.3). This implies that access (location, opening hours, routine-proximate pick-up points) and clear value translation should be combined to convert favourable perceptions into action, rather than assuming value framing works only in affluent segments.

**Proximity dimensions and consumer outcomes**

The analysis highlights distinct functional roles for the three proximity dimensions. Value proximity is the strongest and most consistent predictor of willingness to pay, particularly at higher WTP quantiles. Geographic proximity matters mainly at lower and median WTP levels. Relational proximity is weak and context-dependent, but it provides a necessary trust foundation that enables other proximities to translate into action (H4.1). For practitioners, this means moving beyond a generic "locally grown" claim and **foregrounding concrete value signals** at the point of decision. These include freshness and seasonality, traceability, careful input practices, traditional or region-specific varieties, low processing and clean ingredients, animal welfare, fair price to farmers, and nutrition benefits—always aligned with the values of the target group.

The same differentiation applies to purchase frequency. Regular purchasing is primarily driven by geographic proximity (ease of access, routine integration) and value proximity (perceived benefits). Relational proximity does not, on its own, increase frequency, but it functions as a prerequisite of trust that underpins other drivers (H4.2). Effective practice therefore pairs friction reduction (e.g., convenient opening hours, routine-proximate delivery or pick-up) with consistent reinforcement of value cues in everyday shopping contexts.

**Implementation lessons from pilots and projects**

Evidence from Strength2Food retail pilots shows that in-store priming is most effective when visual cues support immediate-consumption items (e.g., fresh fruit), whereas concise text cues

work better for deferred-consumption items, placed precisely at the point of choice (Brečić et al., 2021). Network-type projects have emphasised multi-channel, routine-proximate access and shared logistics; practice toolkits have underlined consistent value signalling at decision points alongside producer–consumer encounters; and mid-tier innovation work has explored how short-chain benefits can be combined with operational efficiency (Vittersø et al., 2021; Brečić et al., 2021). These directions align closely with the behavioural patterns identified in this study.

The results imply that local food marketing needs to move beyond geography and systematically integrate value and relational dimensions in line with how consumers actually decide. Strategies that start from proximity profiles and are then fine-tuned by age, gender, and income (H3.1–H3.3), while simultaneously improving access and value-based branding, are best positioned to raise both willingness to pay and purchase frequency. Replacing the simplistic "local = near" narrative with clear benefits, easy access, and credible trust aligns day-to-day choices with how consumers perceive local food—and with what ultimately drives behaviour in the market.

## 8.3 Research utility for policy makers

The findings of this dissertation provide insights for policymakers aiming to promote sustainable food systems and strengthen short food supply chains and local food systems. By empirically validating that consumers perceive local food through three interconnected proximity dimensions—geographic, value, and relational (H2.1)—this study establishes the basis for examining their implications across multiple EU policy frameworks. These include the Common Agricultural Policy (CAP), EU food labelling rules, public procurement in catering, Horizon Europe awareness and youth programmes, gender mainstreaming tools (e.g. LEADER), and broader strategies such as the European Green Deal, the Vision for Agriculture and Food (European Commission, 2025), and the Right to Food initiative (European Citizens' Initiative, 2025). The following section explores how the empirical results can inform these policy directions, highlighting opportunities to strengthen accessibility, value-based communication, social equity, generational renewal, gender-sensitive approaches, and sustainability in local food systems.

### Physical accessibility and infrastructure

Geographic proximity was found to be particularly important for low-income consumers (H3.3) and for those with lower willingness to pay (H4.2). This aligns with the EU Rural Development Policy (Regulation (EU) 1305/2013, Art. 17 and 20 (European Union, 2013)), which supports

local markets, logistics, and producer markets. Yet, physical closeness alone does not guarantee regular purchasing. The Vision for Agriculture and Food (European Commission, 2025) also emphasizes reforming public procurement and the EU school scheme to improve access. Policy implications therefore should include targeted infrastructure development in underserved urban areas**, combined with stronger value-based communication**.

**Value-based decisions and labelling**

Value proximity emerged as the strongest and most consistent predictor of both willingness to pay (H4.1) and purchase frequency (H4.2). Consumers are willing to pay a premium not simply because products are local, but because **they associate them with values that matter to them** (quality, health, ethics, etc.). This extends beyond existing EU quality schemes (PDO, PGI, TSG) and food labelling regulations (Regulation (EU) 1169/2011; European Parliament, 2016). The ECI "Right to Food" initiative also underlines that food should not be treated merely as a commodity but as a bearer of values (European Citizens' Initiative, 2025). Policy design should therefore strengthen value-based communication in labelling and information systems, integrating sustainability, nutrition, and cultural values. This also contributes to narrowing the intention–behaviour gap, a challenge also noted in the EU Opinion on SFSCs (European Economic and Social Committee, 2023).

**Producer–consumer relationships**

Relational proximity was found to be important but inconsistent in predicting behaviour (H4.1, H4.2). Rather than acting as a strong independent driver, it functions more as a mediator: while trust and personal connections alone are insufficient to explain behaviour, their absence would likely undermine the effectiveness of both value and geographic proximity. This poses challenges for policy tools focused on community-supported agriculture (CSA), producer groups, and cooperation schemes (CAP Art. 35; European Parliament, 2016). Policies should therefore treat **relational proximity as an enabling condition** that enhances the impact of accessibility and value-based communication. The Annual Food Dialogue proposed in the Vision (European Commission, 2025) illustrates this well: it could serve as a framework for embedding relational proximity into broader systemic discussions, ensuring that trust and shared values between producers and consumers reinforce, rather than substitute, accessibility and value-based communication.

**Social equity and public procurement**

Income-based differences reveal that lower-income groups report stronger value-based and geographic proximity to local food (H3.3). One plausible interpretation is that higher-income consumers may treat quality and ethical attributes as a baseline expectation, whereas lower-income consumers perceive these characteristics more explicitly as added benefits. Relational proximity remains stable across income groups, indicating that social ties to local food are not shaped by financial status. These findings imply that social equity in local food systems cannot be achieved through physical accessibility alone. While value proximity can motivate engagement, it is unlikely to translate into frequent purchasing without convenient access and affordability (H4.2). Therefore, **policies should combine targeted availability** (e.g., location, price, distribution formats) with **value literacy** (communicating freshness, health, cultural relevance, ethics) to convert proximity into behaviour. Environmental objectives are better served when access minimizes consumer travel: if local food requires extra trips, the environmental rationale of short chains can erode, given mixed evidence on SFSC eco-efficiency (European Parliament, 2016).

Within this logic, public procurement becomes a key lever. The European Economic and Social Committee, 2023 stresses procurement reforms, and the European Citizens' Initiative, (2025) calls for universal access to healthy, sustainable school meals. Leveraging these frameworks, procurement can simultaneously improve geographic accessibility and embed value-based food education in everyday settings (schools, hospitals), aligning equity with behaviour change.

**Youth engagement and food literacy**

The study confirmed that younger consumers show weaker perceptions across all proximity dimensions (H3.1). This finding highlights the need for youth-targeted interventions. The Vision (European Commission, 2025) explicitly includes generational renewal and the reform of the EU school scheme, while the European Citizens' Initiative (2025) emphasizes education and awareness. Policy strategies should therefore prioritise **experience-based and digital engagement** to build lasting value-based connections with local food—e.g., school gardens and cooking labs, farm-to-school days, pop-up local markets on campus, challenge-based projects (food entrepreneurship, sustainability sprints), urban agriculture labs, and **peer-led, social-media-native** content. These programmes should not only transmit knowledge but also help young people experience local food as **part of their identity and values**, fostering a sense of

belonging to a **community of practice** (European Commission, 2025; European Citizens' Initiative, 2025).

**Women in food systems**

Women consistently reported stronger perceptions across all proximity dimensions (H3.2). This finding resonates with the European Commission's (2025) proposal to establish a "Women in Farming Platform." Gender-sensitive policy design should thus recognize women as central actors, both as consumers (family-oriented programmes, household-focused communication) and as producers (female farmer partnerships, targeted support). Given women's dual role as key decision-makers in household food purchasing and their increasing presence among small-scale producers, tailored programmes can significantly enhance the effectiveness of local food initiatives.

**Environmental sustainability and misconceptions**

Consumers often assume that local food is automatically more sustainable, yet evidence on the environmental performance of short food supply chains is mixed and "food miles" alone can be a misleading heuristic (European Parliament, 2016). In my assessment, respondents typically evaluated local food as more sustainable than comparable alternatives; an appraisal that can be valid in specific conditions, but the exploratory phase also surfaced recurring misconceptions that treat "local" as an inherent environmental guarantee. Policy responses should therefore prioritise practices with demonstrable impact—such as seasonal products, minimising additional consumer travel by placing local options along existing routines, optimising last-mile logistics in short chains, and reducing food waste through smarter procurement and portioning—while **explicitly correcting oversimplifications** that imply "local = sustainable" by default. Strategies should aim to clarify when and why local alternatives are likely to reduce impacts (e.g., in-season produce supported by efficient distribution) and when they may not (European Parliament, 2016). Public procurement can institutionalise this evidence-based approach by integrating sustainability and nutrition objectives into everyday food environments—especially in schools and hospitals—so that routine menu design, specifications and education align value signals with measurable outcomes rather than assumptions (European Commission, 2025; European Citizens' Initiative, 2025).

Taken together, the results demonstrate that different forms of proximity shape consumer behaviour in distinct ways, with clear implications for multiple EU policy frameworks. To **avoid fragmented or one-dimensional interventions**, policymakers need an integrated

approach that simultaneously addresses accessibility, value communication, equity, generational renewal, gender, and sustainability. **Table 29** below summarises the main policy objectives derived from the dissertation's findings, their empirical justification, and the EU policy instruments to which they connect.

*Table 29 Policy suggestions derived from dissertation findings and related EU frameworks*

| Policy objective | Empirical link | EU instruments / sources |
|---|---|---|
| ***Improve physical accessibility and affordability*** | Geographic proximity matters for lower-income and lower-WTP groups; closeness alone doesn't ensure frequent purchase (H3.3; H4.2). | CAP Rural Development (Reg. 1305/2013, Art. 17, 20); Vision – procurement and school scheme (European Commission, 2025); European Parliament (2016). |
| ***Strengthen value-based communication and labelling*** | Value proximity is the strongest and most consistent driver of WTP and purchase frequency (H4.1; H4.2). | EU labelling (Reg. 1169/2011); CAP quality schemes (PDO/PGI/TSG); European Economic and Social Committee, 2023); European Parliament (2016). |
| ***Relational proximity is a key enabler*** | Important but inconsistent standalone predictor; mediates value/geographic effects (H4.1; H4.2). | CAP cooperation (Art. 35); Vision – Annual Food Dialogue (European Commission, 2025); European Parliament (2016). |
| ***Advance social equity via public procurement and food literacy*** | Lower-income groups show stronger value- and geographic proximity; relational proximity is income-independent (H3.3). | EESC Opinion – procurement reforms (2023); European Citizens' Initiative, 2025 – universal healthy, sustainable school meals (2025); Vision – procurement and school scheme (European Commission, 2025). |
| ***Engage youth through experience-based and digital programmes*** | Younger consumers show weaker proximity across all dimensions (H3.1). | Vision – generational renewal, EU school scheme (European Commission, 2025); European Citizens' Initiative, (2025)– education and awareness. |
| ***Empower women as consumers and producers*** | Women report higher proximity on all dimensions (H3.2). | Vision – Women in Farming Platform (European Commission, 2025). |
| ***Align environmental claims with evidence; correct misconceptions*** | Local often judged "more sustainable"; exploratory phase surfaced misconceptions; SFSC environmental performance is mixed (H2.1 + qual.). | European Parliament (2016); Vision – sustainability in public food environments (European Commission, 2025); ECI – value-driven, evidence-based policy (2025). |

Source: *Self-edited table*

Table 30 in the next page synthesises the key outcomes of the research on local food perception. It illustrates the multidimensional character of local food systems and condenses the empirical findings into academic contributions, practical implications, and policy utilities. This integrative view demonstrates how the results not only advance theoretical understanding but also provide actionable insights for market actors and policymakers.

*Table 30 Summary table of the research utility*

| Topic | Key Findings | Academic utility | Practical utility | Policy utility |
|---|---|---|---|---|
| ***Concept of local food*** | Local food perception is multidimensional (geographic, value, relational) | Empirically validates the three-factor proximity framework (H2.1); links to CLT to explain value–action gap | Enables proximity-profile segmentation; supports targeted marketing beyond "local = near" | Highlights the need for multidimensional policy design (access, values, trust) |
| ***Model validation*** | Three-factor model outperforms one-factor; validated by CFA | Provides a robust measurement scale for local food perception | Offers basis for consumer segmentation profiles | Evidence base for designing SFSC interventions |
| ***Geographic proximity*** | Drives purchase frequency and lower/median WTP; stronger among lower-income consumers | Demonstrates role of spatial access in behavioural models | Reduce frictions: convenient locations, opening hours, routine-proximate pick-up points | Invest in infrastructure and accessibility in underserved areas |
| ***Value proximity*** | Strongest and most consistent predictor of WTP (esp. higher quantiles) and purchase frequency; varies with age and income | Central construct for modelling behavioural commitment | Communicate concrete value cues (freshness, seasonality, traceability, welfare) at the point of decision | Promote food literacy; embed value cues in labelling, procurement, and education |
| ***Relational proximity*** | Weak/inconsistent direct predictor; functions as enabling condition | Shows trust is stable and not income-dependent; supports enabler role | Build trust as prerequisite, not stand-alone driver | Use as complementary tool (CSA, cooperation, Food Dialogues) |
| ***Age differences*** | Older groups perceive stronger value and relational proximity (H3.1) | Raises new research questions: life-cycle vs cohort effects | Storytelling, tradition, and producer identity resonate with older consumers | Youth-targeted programmes (school schemes, digital outreach) needed |
| ***Gender differences*** | Women score higher across all proximities (H3.2) | Confirms importance of gender-sensitive analysis in food studies | Dual-layer messaging: women as evaluators and key purchasers | Design programmes targeting women as consumers and producers |
| ***Income differences*** | Geographic and value proximity vary with income; relational stable (H3.3) | Challenges assumption that relational ties are income-bound | Combine access solutions with value translation for low-income groups | Improve accessibility and affordability in low-income/urban areas |
| ***Willingness to pay (WTP)*** | Value proximity strongest predictor; geographic matters at low/median levels; relational weak (H4.1) | Strengthens behaviourally grounded consumer choice models | Premium branding should emphasise value-based attributes | Support labelling and literacy schemes to foster sustainable choices |
| ***Purchase frequency*** | Driven by geographic and value proximity; relational proximity functions as trust precondition (H4.2) | Provides empirical foundation for segmentation by behavioural outcomes | Pair friction reduction (access) with consistent value reinforcement | Infrastructure and procurement reforms to sustain regular access |

Source: *Self-edited table*

I hope my doctoral study contributes a conceptual and methodological foundation for advancing research on local food perception. By empirically validating a multidimensional proximity framework, uncovering demographic variations, and demonstrating the behavioural relevance of perceived proximity, its aspiration is to inspire future scholars to move beyond static definitions and embrace proximity as a dynamic, multidimensional construct shaped by social, economic, and behavioural contexts.

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# 10 Appendix

The appendices provide additional methodological background and ensure the transparency and reproducibility of the research. They include the psychometric validation of the consumer perception scale with detailed reliability and validity assessments, the finalised questionnaire in both Hungarian and English versions used during the pre-validation phase, and supporting materials that document the refinement of the measurement instrument. In addition, the statistical procedures conducted in R are made accessible through the corresponding scripts and outputs, offering a clear account of the quantitative analyses underlying the dissertation.

## 10.1 Appendix 1: Psychometric validation of the local food proximity scale

Ensuring reliability and validity is essential for any measurement instrument intended to support inference. Unreliable instruments produce unstable scores; invalid instruments fail to capture the intended construct—both compromise interpretation (e.g., McKnight et al., 2007, as cited in Lamm et al., 2020; Sürücü and Maslakçı, 2020). In line with best practice in scale development, I have combined qualitative procedures for content validity (item generation, expert review, cognitive feedback) with quantitative tests of reliability (internal consistency, split-half, temporal stability) and construct validity (EFA/CFA), complemented by convergent, discriminant, and criterion validity checks. Because no single technique guarantees validity across contexts, I have tailored the validation sequence to the theoretical model and research goals.

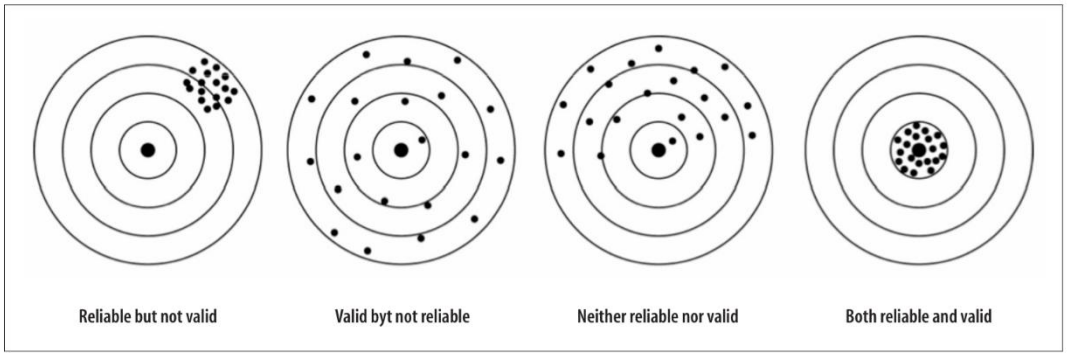



*Figure 20 Possible combinations of validity and reliability of measurement instruments*

Source: *Souza et al., 2017 page 3*

Reliability refers to the consistency of a measurement, meaning it produces stable results when repeated under the same conditions. Validity, however, concerns the accuracy of a measurement, ensuring the instrument measures what it is intended to measure. For instance, a scale must accurately reflect weight. Collecting valid and reliable data is essential for empirical

research. Developing effective scales involves a complex process of item generation and content validation through expert feedback and pre-testing (Lamm et al., 2020; Badenes-Ribera et al., 2020). After the initial qualitative development of a scale, it undergoes a rigorous quantitative examination to assess its reliability and validity (Badenes-Ribera et al., 2020). There is no one-size-fits-all technique for validating scales or items. Instead, the appropriate methods depend on the research topic and objectives, allowing researchers to identify the necessary steps for their specific needs, therefore a tailored validation sequence was designed in this research.

**Reliability (temporal, internal, structural)**

Reliability captures the extent to which scores are consistent across items and occasions. I have assessed internal consistency with Cronbach's α and mean inter-item correlations; split-half reliability using repeated random splits and the Spearman–Brown correction; and temporal stability via test–retest correlations on a sub-sample. For example, if a participant takes a test multiple times, their responses should remain roughly the same each time, assuming the conditions are unchanged.

Reliability can be assessed through various measures (Heale and Twycross, 2015), with key methods including internal consistency (e.g., Cronbach's Alpha), stability over time (e.g., test–retest reliability), and reliability indices (e.g., composite reliability).

**Validity (content, construct, criterion)**

In this dissertation, validity refers to the measurement properties of the scale, specifically content validity, construct validity (including convergent and discriminant validity), and criterion validity; not experimental design validity. Among the various types of validity, three are particularly emphasized in the literature: content validity, construct validity, and criterion validity (Sürücü and Maslakçi, 2020).

**Content validity** evaluates how well each item in a measurement tool represents the intended content area. It ensures the instrument covers all relevant aspects of the variable being measured and is often used in scale development to refine items for cultural relevance and quality (Heale and Twycross, 2015). In fields like social sciences, where concepts may be abstract, content validity helps define and refine these concepts by establishing theoretical definitions and identifying relevant dimensions (Sürücü and Maslakçi, 2020). This type of validity is

qualitative, assessing whether specific elements improve or detract from the overall research or test (Shuttleworth, 2009).

**Construct validity** examines whether the test accurately measures the intended concept. It evaluates how well the measurement tool aligns with theoretical expectations. This ensures that the test measures what it is supposed to measure.

**Criterion validity** assesses whether the results align with established measures or predict relevant outcomes. It ensures the test measures the concrete outcomes it was designed to measure. Criterion validity is evaluated later via associations with willingness to pay (WTP) and purchase frequency (see H4.1–H4.2).

These types of validity are essential for ensuring the accuracy and applicability of research findings.

In the following sections, the validation strategy developed for this research is outlined in detail. The process is structured in two main phases: pre-validation and post-validation, each incorporating both qualitative and quantitative methods. The instrument's reliability is assessed through more approaches, including internal consistency (Cronbach's alpha), split-half reliability, and stability in time. Validity is examined along several dimensions: content validity (via expert and producer interviews), construct validity (through factor analytic procedures), convergent and discriminant validity (using AVE, CR, and HTMT indicators), and criterion validity (through behavioural outcome associations). This ensures that the scale used to measure consumer perceptions of local food meets the standards of psychometric rigor and is both theoretically grounded and empirically strong.

**The process of validation and reliability**

Based on the literature review and established psychometric principles, I developed a validation procedure that employs a systematic two-phase approach (**pre- and post-validation**) combining **qualitative and quantitative** methodologies. The procedure emphasizes **data triangulation** through the integration of expert evaluations, consumer interviews, and producer interviews, creating a foundation for content validity that addresses multiple stakeholder perspectives and strengthens the overall psychometric properties of the instrument. The flow of validation and reliability examinations are illustrated in Figure 22 and Figure 23 later.

The flowchart above outlines the key phases of the scale development process, including both pre-validation and post-validation stages. The validation procedure began with item generation

and expert evaluations, followed by pilot testing and initial reliability assessments. In the post-validation phase, the scale was refined and tested using advanced statistical methods with a representative sample. Throughout the process, both qualitative and quantitative methods were applied in parallel, ensuring data triangulation and stakeholder-informed refinement. Specific attention was paid to temporal stability, internal consistency, structural fit, and content relevance. In the following sections, each validation step is described in detail, following the chronological and methodological order illustrated in the figure.

**Design of the initial consumer questionnaire**

Based on the theoretical model, an initial scale for the consumer survey was developed. This process involved generating items for the questionnaire and applying predefined inclusion and exclusion criteria to ensure the validity of the responses.

*Table 31 Inclusion and exclusion criteria of survey participants*

| | |
|---|---|
| ***Inclusion criteria*** | Participants must be adults, over 18 years of age. |
| | Participants must be Hungarian citizens and speak adequately Hungarian. |
| | Each participant is allowed to complete the questionnaire only once. |
| ***Exclusion Criteria:*** | A check question, which appears twice in the questionnaire in the same format, is included to identify respondents who may be answering randomly. If a participant's responses to this check question are inconsistent (deviation is greater, than 2), their answer is excluded. |
| | Participants are excluded if their scale variance was 0, indicating unreliable or non-meaningful responses. |
| | Questionnaires with more than 25% of responses left blank are excluded, as incomplete responses could compromise the validity of the data. |

Source: *Self-edited table*

These criteria help ensure that the data collected is both reliable and valid for the study. The items in the questionnaire are designed to align with attributes of the theoretical model. The goal was to develop a comprehensive set of items that thoroughly capture various aspects of consumer perceptions of local food. In this phase, it is crucial to consider factors such as context and the intended audience, including variables like connectivity, reading level, and available time, among others (DeVellis and Thorpe, 2021, as cited in Lamm et al., 2020). As a result, 54 potential scale items were developed, based on insights from both the literature and qualitative exploratory research.

**Pilot test**

The pilot test allowed me to observe how the data behaved and identify items that needed to be excluded before conducting the investigation with a larger sample. Initially, 265 participants were included in the pilot test. After applying the inclusion and exclusion criteria, the final sample size was reduced to 227 participants.

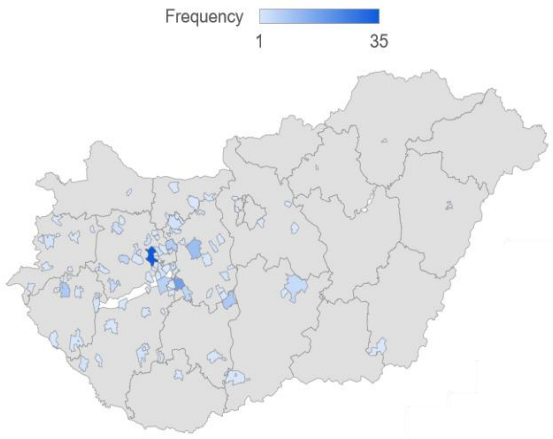
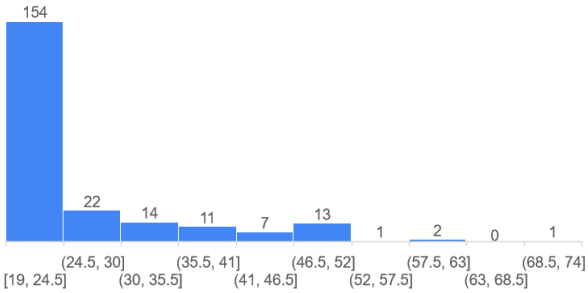
| Place of residence (pilot participants) | Age group of the participants (pilot participants) |
|---|---|
|  |  |
| Source: *Self-edited figure* | Source: *Self-edited figure* |

*Figure 21 Place of residence, and distribution based on age (pre-validation)*

Source*: Self-edited figure*

Data collection took place offline in Veszprém, Hungary, from March 1, 2024, to March 30, 2024. Among the participants, 39% were male and 61% were female, with the majority belonging to younger age groups. Additionally, most participants were from the Central Hungary region.

## Pre-validation phase

The pre-validation phase focused on the development and initial assessment of the consumer perception scale. This stage combined qualitative and quantitative methods to refine the draft instrument, evaluate content validity, and conduct preliminary tests of reliability and construct validity. The process began with item generation informed by the literature and qualitative research findings, followed by expert and consumer interviews to ensure content adequacy and clarity. A pilot study (n=227) was then carried out to evaluate the initial scale's performance, complemented by a small-scale test–retest procedure to examine temporal stability.

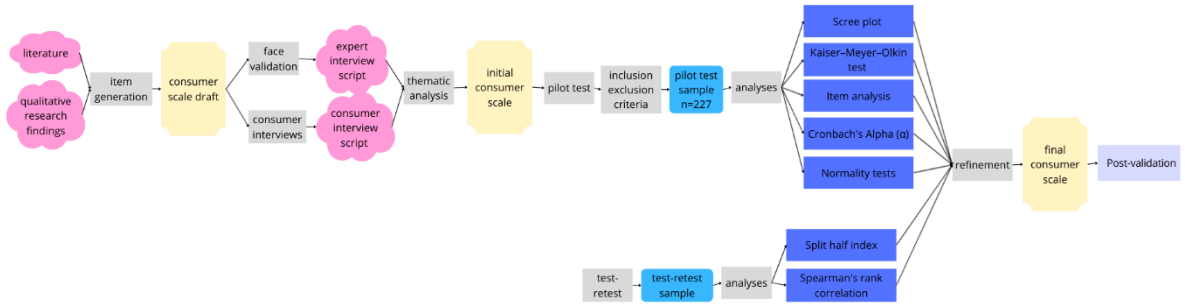



*Figure 22 Logical sequence of the pre-validation phase*

Source*: Self-edited figure*

Figure 22 illustrates the logical sequence of the pre-validation phase. Each shape represents a different type of step in the procedure: pink clouds indicate qualitative inputs (literature, interview scripts, consumer and expert feedback); grey rectangles represent methodological steps or analytical procedures (e.g., pilot test, inclusion/exclusion criteria, analyses); blue rectangles denote statistical tests (e.g., scree plot, Cronbach's alpha); light blue rectangles indicate data samples (pilot test, test–retest); and yellow rectangles mark the evolving versions of the consumer scale (draft, initial, final). The figure shows how these steps are interconnected, ultimately leading to a refined version of the consumer scale that is ready for post-validation testing. In the following sections, the specific analyses conducted during the pre-validation phase are described in detail, beginning with reliability tests.

**Reliability**

In the pre-validation phase, reliability was ensured through multiple steps.

**Stability over time**

The concept of test-retest reliability extends from the idea of inter-rater reliability, which measures agreement or consistency across different observers. Test-retest reliability, however, focuses on assessing consistency across multiple measurements of the same variable under similar conditions (Chen et al., 2021). In a test-retest reliability examination, a selected group of consumers completes the questionnaire at two different times, typically with an interval of several weeks. For example, participants complete the questionnaire initially and then again after three weeks. The correlation between their responses at these two time points is analysed to assess stability. For an instrument to demonstrate stability, there should be a high correlation between the scores obtained at each time.

According to Heale and Twycross (2015), the strength of the correlation is categorized as follows:

- **Weak correlation:** Correlation coefficient less than 0.3
- **Moderate correlation:** Correlation coefficient between 0.3 and 0.5
- **Strong correlation:** Correlation coefficient greater than 0.5

In the test-retest reliability assessment conducted between May 1, 2024, and June 1, 2024, five consumers participated. I have used Spearman's ρ given the ordinal (Likert) responses and small re-test sample (future waves will complement this with ICC when n allows).

*Table 32 Results of the test-retest reliability examinations*

| Participants | Age | Gender | Spearman's rank correlation | Acceptance |
|---|---|---|---|---|
| Participant 1 | 60 | female | 0.8020206 | Strong – accepted |
| Participant 2 | 40 | female | 0.9517602 | Strong – accepted |
| Participant 3 | 26 | female | 0.4849429 | Moderate - accepted |
| Participant 4 | 26 | Male | 0.3779793 | Moderate - accepted |
| Participant 5 | 41 | Male | 0.556564 | Strong – accepted |

Source*: Self-edited table*

The results are evaluated using Spearman's rank correlation coefficient to assess the consistency of responses over time. In general, correlation coefficients between 0.4 and 0.7 and between 0.7 and 0.9 indicate moderate and strong correlations (Lee,Yim and Kim, 2018). Overall, the test-retest results show a good degree of consistency, with three participants (1, 2, and 5) demonstrating strong reliability, as their Spearman's rank correlations were above 0.5. This

indicates a high degree of stability in their responses over time. Participants 3 and 4 showed moderate reliability, with correlations between 0.3 and 0.5. While these are still acceptable, they suggest a lower but adequate level of consistency.

The sample was intentionally selected to include participants across different genders and age groups to ensure diversity in perspectives. However, there is noticeable variation in the consistency of responses over time between participants. This deviance could potentially reflect differences in the individuals themselves rather than the instrument, as participant factors like understanding, attention, or motivation may have influenced their answers. Given the small sample size (5 participants), these findings offer preliminary support for the stability of the instrument. Expanding the sample size would be beneficial for achieving more robust results and for further investigating the role of participant variability in response consistency.

**Internal consistency - Cronbach's Alpha (α)**

Internal consistency, which refers to how well items within a test measure the same concept or construct, indicates the coherence of the items in the test (Tavakol and Dennick, 2011). Cronbach's Alpha (α) is a commonly used measure of internal consistency, expressed as a value between 0 and 1. Establishing internal consistency is crucial before using a test for research or assessment purposes to ensure both validity and reliability. It describes the extent to which all items in a test measure the same concept or construct, highlighting the interrelatedness of the items within the test (Tavakol and Dennick, 2011).

*Table 33 General Interpretation of Cronbach's Alpha (α)*

| Value of alpha | Interpretation | Action needed |
|---|---|---|
| $\alpha > 0.90$ | Excellent reliability | Are there redundant items? |
| $0.80 < \alpha < 0.90$ | Good reliability | Items measure the same concept. |
| $0.70 < \alpha < 0.80$ | Acceptable reliability | Acceptable, but there is room for improvement. |
| $\alpha < 0.70$ | Poor reliability | Need for improvement, not acceptable. |

Source: *Self-edited table*

To assess the reliability of the latent variables within the model, Cronbach's Alpha was calculated for each of the three constructs: value proximity, relational proximity, and geographic proximity. Cronbach's Alpha is a measure of internal consistency, indicating how well the items within a scale measure the same underlying concept.

*Table 34 The internal consistency (Cronbach's α) of the latent variables in the pilot*

| Latent Variable | Cronbach's α | Interpretation |
|---|---|---|
| Value proximity | 0.86 | Good internal consistency, accepted. |
| Relational proximity | 0.83 | Good internal consistency, accepted. |
| Geographic proximity | 0.80 | Good internal consistency, accepted. |

Source: *Self-edited table*

According to the item-analysis outputs, post-validation mean inter-item correlations were 0.396 (Geographic), 0.410 (Value), and 0.467 (Relational), i.e., cohesive but non-redundant sets of indicators. Overall, all three constructs (value proximity, relational proximity, and geographic proximity) demonstrated strong internal consistency, with Cronbach's Alpha values well above the acceptable threshold of 0.70 (Shuttleworth, 2009). This confirms that the items within each latent variable are appropriate and reliable for capturing their respective underlying dimensions.

**Split half index**

Items are randomly divided into two groups, and correlation is examined between these. Correlations are calculated comparing both halves. The test is repeated more times with more randomly divided samples. Strong correlations indicate high reliability, while weak correlations indicate the instrument may not be reliable (Heale and Twycross, 2015).

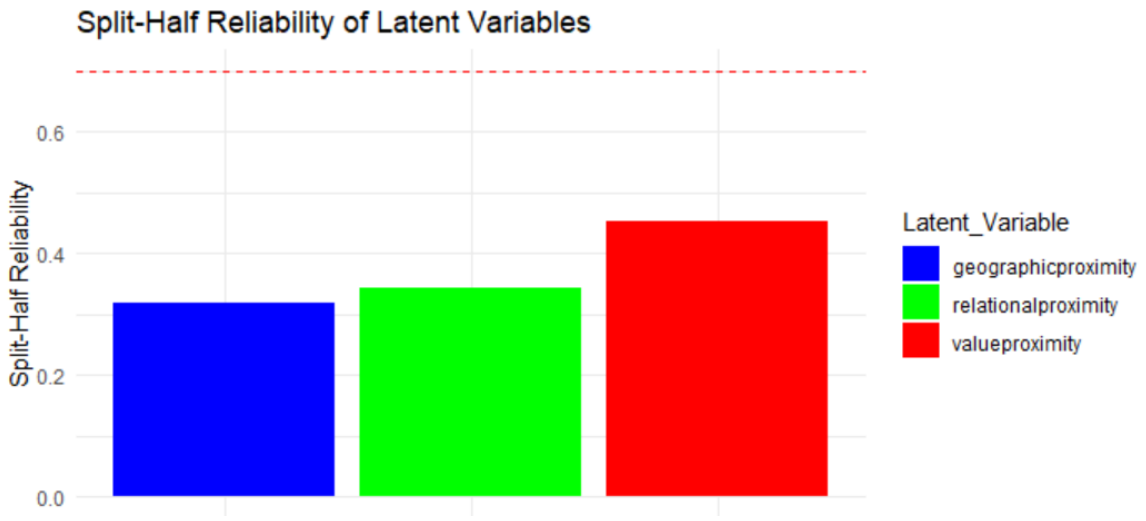



*Figure 23 Split-half reliability of latent variables (pilot)*

Source: *Self-edited figure*

I report split-half reliability coefficients obtained via repeated random splits. For value proximity, the reliability score is 0.452. This score indicates moderate reliability. For relational proximity, the reliability score is 0.342; and for geographic proximity, the reliability coefficient is 0.319 regarding the pilot. These scores are relatively low, indicating poor reliability. The consistency of the relational proximity indicators in measuring the underlying construct is weaker, which could affect the overall validity of the measure. It suggests there may be too much variability. Generally, a reliability score of 0.7 or above is considered acceptable, meaning the measure may have some issues with consistency. The inadequate split-half reliability scores can be also caused by the small sample size, but besides that, results might suggest that the measures for all three latent variables need improvement to achieve acceptable reliability levels.

## Validity

### Content validity (expert face validation)

Content validity in social sciences can be established through several methods, including literature reviews, the Delphi method, or consultations with a panel of experts (Lamm et al., 2020). However, the most robust approaches often involve using multiple sources to establish content validity. While a literature review is valuable, it may not fully define the content domain the scale aims to address. Consulting external experts can provide additional insights and triangulate the concept, revealing aspects that might otherwise be overlooked (Lamm et al., 2020). Accordingly, in this research, researchers have been involved, who have experience in consumer research.

In the face-validation process, participants reviewed the questionnaire and evaluated whether the questions effectively capture the intended topic. They assessed each item individually and determined how well it contributes to the measurable latent variables. This process included reviewing items related to proximities as well as additional aspects. The general guiding questions for the review were:

- Are the questions relevant to the purpose of the measurement?
- Does the measurement method seem appropriate for capturing the variable?
- Is the measurement adequate for accurately assessing the variable?

In the face-validation process, participants provided feedback by commenting on the items and scoring them based on their level of acceptance: not accepted, accepted with modifications, or fully accepted. This evaluation aimed to refine the items and ensure their clarity, relevance, and validity. They also had the opportunity to suggest further elements, if they felt that the latent variable was not fully captured by the statements.

Four experts contributed their expertise to this process, all associate professors from University of Miskolc, University of Debrecen, and University of Pannonia. Based on their expertise, all working in consumer research, from the disciplines of Political Science and Sociology, Management, and Economics. Their insights and assessments played an important role in enhancing the validity and applicability of the items under review. I have considered their insights and made changes to the final questionnaire based on their feedback. While all researchers found the concept interesting and generally accepted the questionnaire, they suggested modifications, which were incorporated into the final version. The face-validation form is provided in Appendix 4.

**Construct validity**

Although a confirmatory factor analysis (CFA) was not conducted in the pilot phase, preliminary exploratory procedures were applied to evaluate the scale's structural validity. First, the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was calculated based on Spearman correlations. The overall KMO value was **0.90**, which is considered excellent (Kaiser, 1974), indicating that the dataset is suitable for factor analysis. Most individual item MSA values exceeded **0.80**, confirming adequacy at the item level as well.

*Table 35 Item-level sampling adequacy values by proximity group based on KMO (pre-validation)*

| Proximity | Item | MSA Value |
|---|---|---|
| ***Value proximity*** | VT1 | 0.89 |
| | VT2 | 0.92 |
| | VT2a | 0.90 |
| | VT3 | 0.94 |
| | VC1 | 0.87 |
| | VC2 | 0.86 |
| | VC2a | 0.87 |
| | VC3 | 0.92 |
| | VC3a | 0.94 |
| | VI1 | 0.92 |
| | VI1a | 0.92 |
| | VI2 | 0.88 |
| | VI2a | 0.93 |
| ***Relational proximity*** | RT1 | 0.93 |
| | RT1a | 0.94 |
| | RT2 | 0.91 |
| | RT2a | 0.91 |
| | RC1 | 0.83 |
| | RC1a | 0.90 |
| | RC2 | 0.93 |
| | RC3 | 0.91 |
| | RI1 | 0.85 |
| | RI1a | 0.85 |
| | RI2 | 0.87 |
| | RI3 | 0.85 |
| | RI3a | 0.85 |
| ***Geographic proximity*** | GT1 | 0.95 |
| | GT1a | 0.90 |
| | GT2 | 0.86 |
| | GT2a | 0.90 |
| | GC1 | 0.94 |
| | GC2 | 0.74 |
| | GC2a | 0.82 |
| | GC3 | 0.92 |
| | GI1 | 0.87 |
| | GI1a | 0.89 |
| | GI2 | 0.80 |

Source:

*Self-edited table, calculated by the author using the psych R package (function: KMO(), correlation method: Spearman)*

In addition, a scree plot was generated to estimate the optimal number of latent factors. The plot revealed a clear "elbow" after the third component (see Figure 24), suggesting that a three-factor solution is theoretically and empirically justified.

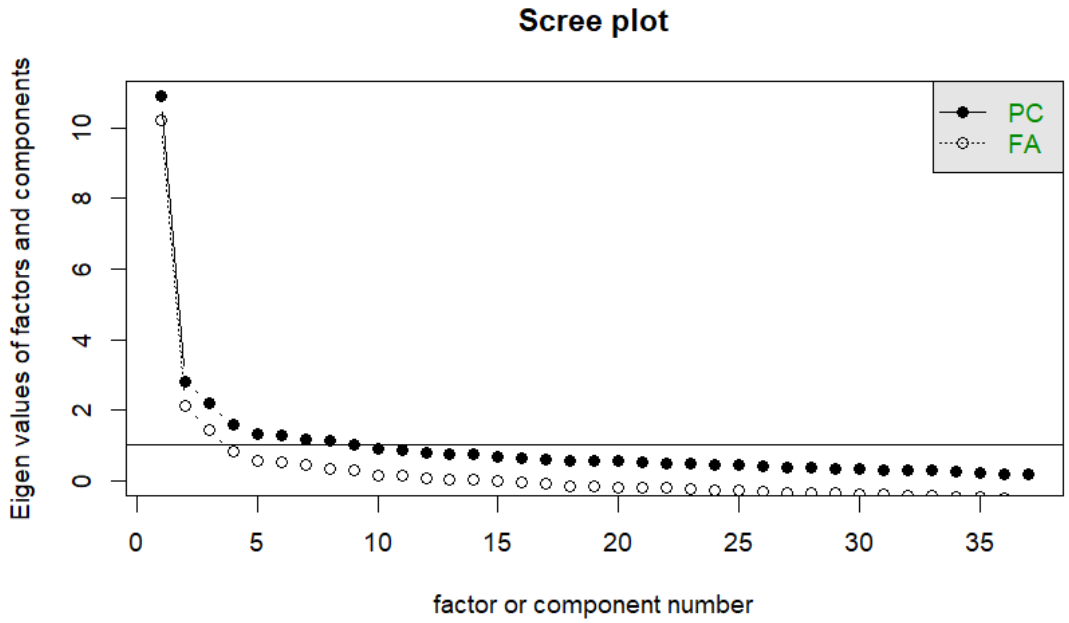



*Figure 24 Scree plot of eigenvalues for Principal Components (PC) and Factor Analysis (FA) pre-validation*

Source: *Created by the author using the psych R package (function: scree(), correlation method: Spearman)*

This finding is consistent with the proposed conceptual framework, which distinguishes **value proximity**, **relational proximity**, and **geographic proximity** as separate latent constructs.

**Convergent and discriminant validity**

Composite Reliability (CR) and Average Variance Extracted (AVE) were not calculated in the pilot phase, as no confirmatory factor model was yet estimated. These indicators of convergent and discriminant validity will be assessed during the post-validation stage, based on the full dataset and a validated measurement model.

**Criterion validity**

Criterion validity was not assessed at this stage, as no external behavioral or outcome variable was included in the pilot dataset. During the final data collection, the association between the proximity scales and consumer behavior (e.g. willingness to pay, purchase frequency) will be analyzed to examine criterion-related validity.

**Statistical assumptions**

Normality tests (Shapiro–Wilk, KS, histogram)

To assess normality and determine whether parametric or non-parametric tests should be used, I employed a strict one-sample Kolmogorov-Smirnov test, to assess whether the three latent variables follow a normal distribution.

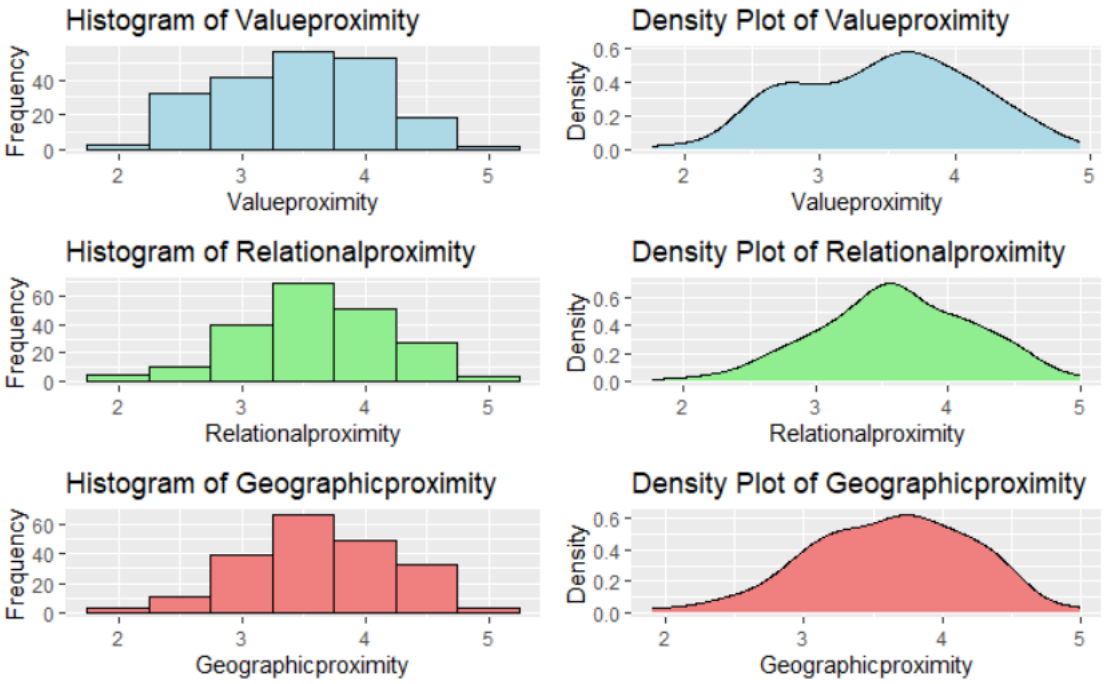



*Figure 25 Histogram and density plot for the three latent variables (pilot)*

Source: *Self-edited figure from R-Studio*

For the **value proximity** latent variable, the test results indicate a Shapiro–Wilk W value of 0.98514 and a p-value of 0.03049. Since the p-value is less than 0.05, this indicates a significant deviation from a normal distribution, suggesting that the value proximity data do not follow a normal distribution.

In contrast, for the **relational proximity** latent variable, the W value is 0.99248 and the p-value is 0.3809. As the p-value exceeds the 0.05 significance level, there is not enough evidence to reject the null hypothesis of normal distribution. Therefore, it is likely that the relational proximity data follow a normal distribution.

Similarly, for the **geographic proximity** latent variable, the W value is 0.98903 and the p-value is 0.1203. The p-value is also greater than 0.05, indicating that the distribution does not significantly deviate from normality. Given Likert-type data and the larger-sample models

reported later, I rely on robust estimators and, where relevant, verify assumptions at the residual level. While the Kolmogorov–Smirnov test was conducted to assess normality, it is known to have low power in small samples and becomes overly sensitive in very large samples. Therefore, its results were interpreted with caution and complemented with visual diagnostics (histogram, density plot) and the Shapiro–Wilk test, which is more appropriate for small samples.

**Conclusions based on the pre-validation phase**

The pre-validation phase was vital strengthening the structure and empirical robustness of the scale. Initial analyses indicated that the scale performed well in terms of internal consistency, with all three proximity dimensions showing Cronbach's Alpha values above the acceptable threshold. Test–retest reliability also suggested moderate to strong temporal stability for most participants. However, the split-half reliability results were below the recommended level, pointing to internal inconsistencies within item groupings, partly likely due to the small pilot sample. Therefore, I have emphasised improved internal structure during post-validation and re-assessed internal consistency with multiple indices. In response to these findings and based on feedback from expert reviewers and consumers, several refinements were made. The original **item pool was reduced**, as participants perceived the initial version as too lengthy and repetitive. Some **items were removed** due to their conceptual complexity or inconsistent interpretation, while others were **reworded** to improve clarity and accessibility. Expert evaluation also led to the **inclusion of additional items** where theoretical gaps were identified, thereby enhancing content validity and alignment with the latent constructs. These helped to improve the conceptual coherence, readability, and empirical suitability of the instrument.

Following the refinements made during the pre-validation phase, the revised version of the scale was tested in a representative sample. This post-validation stage enabled the application of advanced psychometric analyses to further evaluate the scale's structure, reliability, and validity. The next section presents the results of this phase.

**Post-validation phase**

The post-validation phase aimed to rigorously evaluate the refined consumer perception scale with a representative sample and complementary methods. This stage provided a comprehensive assessment of the instrument's psychometric properties, combining large-scale quantitative analyses with test–retest stability checks and qualitative feedback from consumers and producers. The goal was to establish the reliability, validity, and practical applicability of the scale before its use in subsequent analyses.

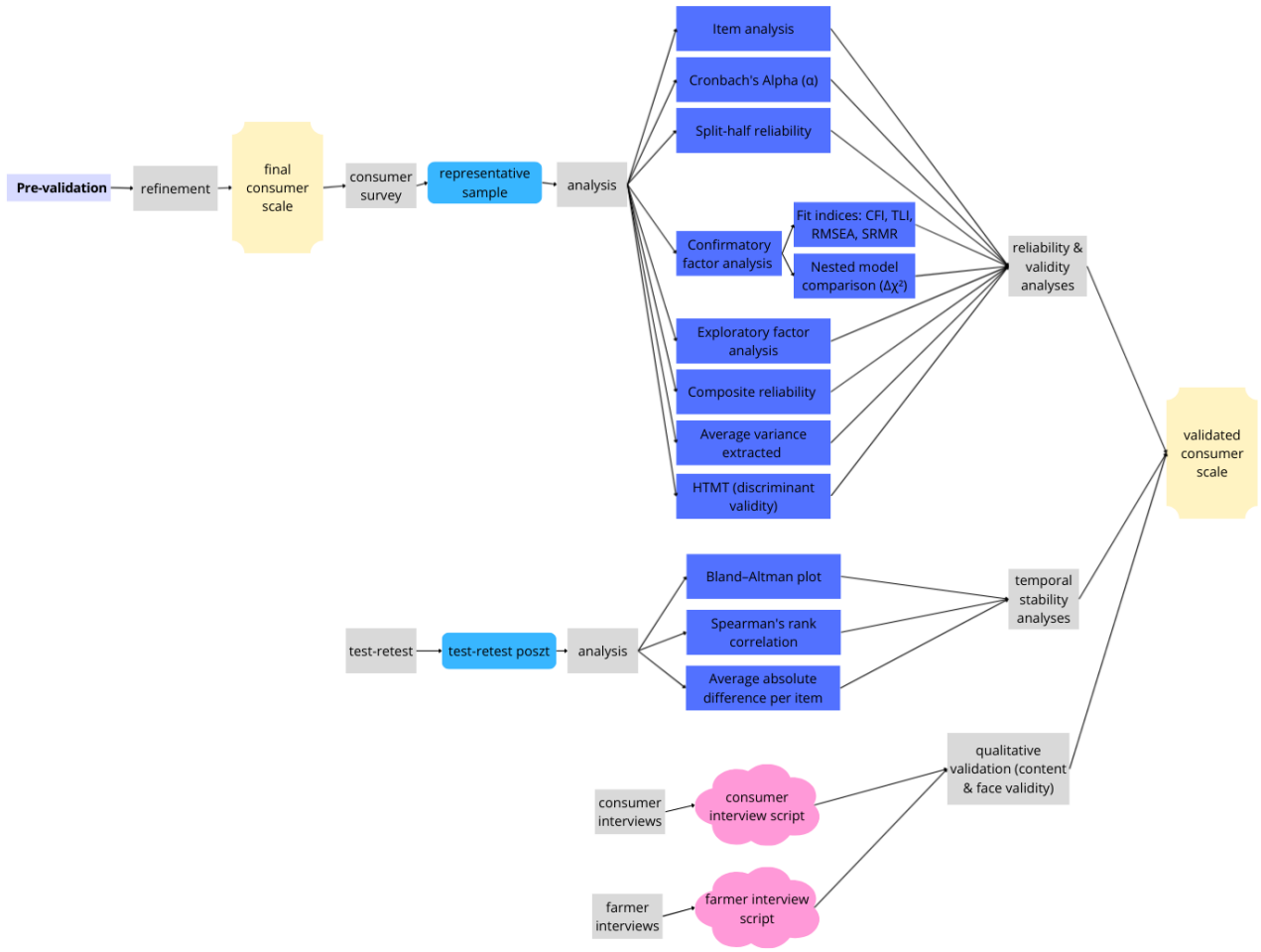



*Figure 26 Logical sequence of the post-validation phase*

Source*: Self-edited figure*

Figure 26 illustrates the structure of the post-validation process. Light blue rectangles indicate data samples (representative survey, post-validation test–retest); grey rectangles represent methodological steps; dark blue rectangles denote statistical analyses (e.g., item analysis, Cronbach's alpha, factor analyses, fit indices, CR, AVE, HTMT); pink clouds show qualitative inputs (consumer and farmer interviews); and yellow rectangles mark the scale's evolving state,

culminating in the validated consumer scale. The figure highlights how quantitative and qualitative procedures together informed the final validation of the instrument.

In the following sections, reliability is examined through item analysis, Cronbach's alpha, and split-half indices. Validity is then addressed using exploratory and confirmatory factor analyses, model comparisons, and convergent/discriminant measures. Temporal stability is assessed by test–retest methods (Spearman's correlations, Bland–Altman plots, mean item differences). Finally, consumer and farmer interviews provide qualitative support for content and face validity.

## Reliability

### Internal consistency

#### *Item analysis for indicators*

To evaluate the internal consistency and reliability of the proximity scale items (measured on a 1–5 Likert scale), an item analysis was conducted. Cronbach's alpha was calculated to assess internal consistency, with values above 0.70 indicating acceptable reliability and values above 0.80 reflecting good reliability. Item-level descriptive statistics, including means and standard deviations (SD), were computed to examine central tendency and variability. Given the theoretical midpoint of 3 on a 5-point Likert scale, item means were interpreted with caution. Rather than applying a fixed acceptable range, emphasis was placed on whether items exhibited sufficient variance and avoided ceiling or floor effects. Skewness was also evaluated, with values between –1 and +1 considered indicative of approximately symmetrical distributions. Additionally, item difficulty was assessed, with values between 0.2 and 0.8 generally reflecting adequate variability. Item discrimination, which reflects the item's ability to distinguish between respondents with low and high total scores, was considered acceptable above 0.30. Finally, "Cronbach's alpha if deleted" values were reviewed to assess whether removing any item would improve overall scale reliability.

*Table 36 Post-validation item analysis for geographic scale items*

| *Row* | *Missings* | *Mean* | *SD* | *Skew* | *Item Difficulty* | *Item Discrimination* | *α if deleted* |
|---|---|---|---|---|---|---|---|
| GI1 | 0.00 % | 3.8 | 1.24 | -0.79 | 0.76 | 0.47 | 0.87 |
| GC1 | 0.00 % | 2.87 | 1.14 | 0.05 | 0.57 | 0.44 | 0.87 |
| GT1 | 0.00 % | 3.08 | 1.25 | -0.18 | 0.62 | 0.53 | 0.87 |
| GC3 | 0.00 % | 4.09 | 0.97 | -0.99 | 0.82 | 0.54 | 0.87 |
| GI3 | 0.00 % | 4.19 | 1.04 | -1.2 | 0.84 | 0.67 | 0.86 |
| GC2 | 0.00 % | 4.11 | 1.05 | -1.2 | 0.82 | 0.61 | 0.86 |
| GT2 | 0.00 % | 3.92 | 1.08 | -0.95 | 0.78 | 0.68 | 0.86 |
| GT3 | 0.00 % | 4.03 | 1.06 | -1 | 0.81 | 0.69 | 0.86 |
| GC4 | 0.00 % | 3.81 | 1.08 | -0.71 | 0.76 | 0.61 | 0.86 |
| GI2 | 0.00 % | 3.61 | 1.16 | -0.53 | 0.72 | 0.58 | 0.86 |
| GI4 | 0.00 % | 4.05 | 1.09 | -1.06 | 0.81 | 0.61 | 0.86 |

*Mean inter-item-correlation=0.396 · Cronbach's α=0.875*

Source: *Own calculation, output generated using the sjPlot package in R*

The analysis indicated that the geographic items possess good internal reliability (together Cronbach's α = 0.875). Item means ranged from 2.87 (item GC1) to 4.19 (item GI3), showing moderate-to-high overall respondent agreement. Standard deviations varied between 0.97 and 1.25, representing acceptable response variability. Skewness values ranged from -1.2 to 0.05, suggesting a slight negative skewness, typical for Likert-scale data. Item difficulty ranged between 0.57 (GC1) and 0.84 (GI3), confirming appropriate item difficulty levels. All items exhibited satisfactory discrimination (between 0.44 and 0.69), effectively distinguishing between higher and lower geographic proximity perceptions. Additionally, Cronbach's alpha-if-deleted remained consistently high (between 0.86–0.87), indicating no single item adversely affected the reliability, and thus the scale is robust for further analyses.

*Table 37 Post-validation item analysis for value scale items*

| *Row* | *Missings* | *Mean* | *SD* | *Skew* | *Item Difficulty* | *Item Discrimination* | *α if deleted* |
|---|---|---|---|---|---|---|---|
| VI1 | 0.00 % | 3.96 | 1.05 | -0.85 | 0.79 | 0.55 | 0.90 |
| VC1 | 0.00 % | 4.33 | 0.92 | -1.46 | 0.87 | 0.60 | 0.90 |
| VT1 | 0.00 % | 3.69 | 1.13 | -0.55 | 0.74 | 0.74 | 0.89 |
| VT2 | 0.00 % | 3.68 | 1.11 | -0.55 | 0.74 | 0.72 | 0.90 |
| VC2 | 0.00 % | 3.57 | 1.1 | -0.46 | 0.71 | 0.71 | 0.90 |
| VT3 | 0.00 % | 3.62 | 1.09 | -0.54 | 0.72 | 0.74 | 0.89 |
| VC3 | 0.00 % | 3.53 | 1.07 | -0.43 | 0.71 | 0.75 | 0.89 |
| VC4 | 0.00 % | 3.92 | 1.03 | -0.78 | 0.78 | 0.63 | 0.90 |
| VC5 | 0.00 % | 3.57 | 1.08 | -0.47 | 0.71 | 0.58 | 0.90 |
| VI2 | 0.00 % | 3.54 | 1.21 | -0.46 | 0.71 | 0.58 | 0.90 |
| VI2A | 0.00 % | 3.11 | 1.17 | -0.18 | 0.62 | 0.64 | 0.90 |
| VC6 | 0.00 % | 3.59 | 1.17 | -0.55 | 0.72 | 0.60 | 0.90 |
| VC7 | 0.00 % | 3.85 | 1.07 | -0.81 | 0.77 | 0.18 | 0.92 |
| VI3 | 0.00 % | 3.29 | 1.21 | -0.29 | 0.66 | 0.51 | 0.90 |

*Mean inter-item-correlation=0.410 · Cronbach's α=0.906*

Source: *Own calculation, output generated using the sjPlot package in R*

The item analysis revealed that the value scale items have excellent internal reliability together (Cronbach's α = 0.906). Mean scores ranged from 3.11 (item VI2A) to 4.33 (item VC1), reflecting moderate-to-high agreement among respondents. Standard deviations varied between 0.92 and 1.21, suggesting appropriate variability. Skewness values ranged from -1.46 to -0.18, indicating generally acceptable negative skewness, typical for Likert-scale data. Item difficulty scores ranged from 0.62 (VI2A) to 0.87 (VC1), demonstrating appropriate item difficulty levels, though somewhat higher agreement was observed on certain items (e.g., VC1). Item discrimination values were mostly strong (between 0.51 and 0.75), highlighting effective differentiation among respondents, except for item VC7 (0.18), which showed lower discrimination. The Cronbach's alpha-if-deleted values (mostly around 0.89–0.90) indicated that the removal of any single item, except for VC7, would not significantly improve reliability. Item VC7, with lower discrimination, would increase alpha slightly to 0.92 if removed,

indicating potential for reconsideration (VC7 is excluded from the final latent variable in our calculations). Altogether, the scale demonstrated strong reliability and robustness for further analyses.

*Table 38 Post-validation item analysis for relational scale items*

| *Row* | *Missings* | *Mean* | *SD* | *Skew* | *Item Difficulty* | *Item Discrimination* | *α if deleted* |
|---|---|---|---|---|---|---|---|
| RT1 | 0.00 % | 4.19 | 0.99 | -1.14 | 0.84 | 0.52 | 0.90 |
| RT2 | 0.00 % | 4.03 | 1.04 | -0.97 | 0.81 | 0.67 | 0.90 |
| RC3 | 0.00 % | 4.13 | 0.96 | -0.97 | 0.83 | 0.57 | 0.90 |
| RT3 | 0.00 % | 3.61 | 1.07 | -0.52 | 0.72 | 0.68 | 0.90 |
| RC1 | 0.00 % | 3.69 | 1.14 | -0.71 | 0.74 | 0.50 | 0.90 |
| RT4 | 0.00 % | 3.6 | 1.1 | -0.54 | 0.72 | 0.68 | 0.90 |
| RC2 | 0.00 % | 4.2 | 0.99 | -1.2 | 0.84 | 0.68 | 0.90 |
| RI1 | 0.00 % | 3.95 | 1.09 | -0.83 | 0.79 | 0.75 | 0.89 |
| RI2 | 0.00 % | 3.51 | 1.23 | -0.39 | 0.70 | 0.65 | 0.90 |
| RI3 | 0.00 % | 4.08 | 1.07 | -1.07 | 0.82 | 0.71 | 0.89 |
| RI4 | 0.00 % | 3.86 | 1.15 | -0.77 | 0.77 | 0.71 | 0.89 |

*Mean inter-item-correlation=0.467 · Cronbach's α=0.906*

Source: *Own calculation, output generated using the sjPlot package in R*

The relational scale items also showed excellent internal consistency together (Cronbach's α = 0.906). Mean item scores ranged from 3.51 (RI2) to 4.20 (RC2), reflecting moderate-to-high respondent agreement. The standard deviations ranged between 0.96 and 1.23, indicating sufficient response variability. Skewness ranged from -1.20 to -0.39, indicating typical and acceptable negative skewness levels, common for Likert-type measures. Item difficulty values ranged from 0.70 (RI2) to 0.84 (RT1, RC2), indicating suitable and balanced item difficulty across the scale. Item discrimination values were uniformly high (ranging between 0.50 and 0.75), suggesting all items effectively differentiate between participants with varying relational proximity perceptions. Additionally, Cronbach's alpha-if-deleted consistently remained at 0.89–0.90, confirming that the removal of any single item would not significantly enhance reliability.

The mean inter-item correlations were 0.396 (Geographic), 0.410 (Value), and 0.467 (Relational), indicating coherent but non-redundant item sets. Cronbach's α for the three scales were 0.875 (Geographic), 0.906 (Value), and 0.906 (Relational), confirming good–excellent internal consistency.

**Split-half reliability**

The split-half reliability is applied to assess the internal consistency of a scale or a set of items measuring the same construct. It evaluates how well the items in a test correlate with each other when the test is divided into two equal halves. A high split-half reliability score suggests that the test items measure the same underlying construct consistently. I have performed three test for the three expected latent variables, then for the latent variables used in this research.

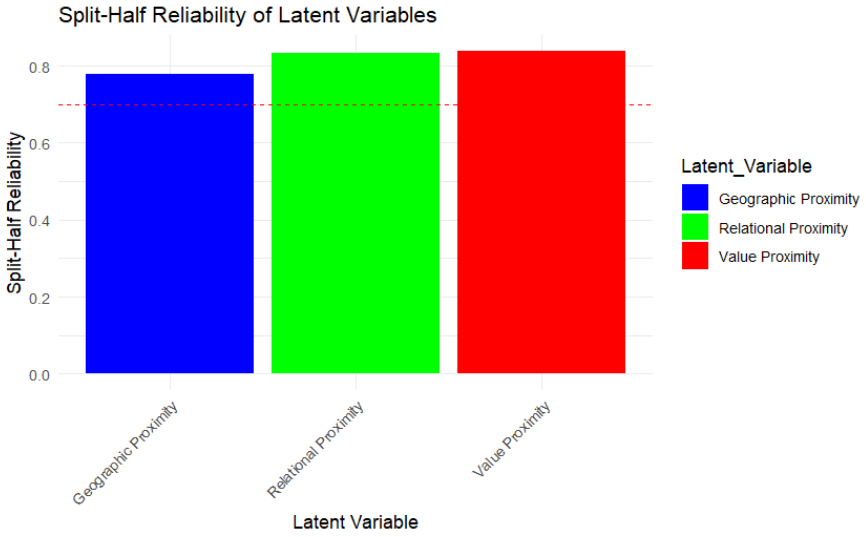



*Figure 27 Internal consistency of proximity constructs for post validation: split-half reliability*

Source: *Own calculation using R Studio with the psych and ggplot2 packages*

A reliability coefficient above 0.7 is considered acceptable, while values above 0.8 indicate strong internal consistency. The results demonstrate high reliability across all three constructs. Value (0.837) and relational proximity (0.834) exhibit strong internal consistency, confirming that the indicators within these dimensions reliably measure the same underlying concept. Geographic proximity (0.778) also shows acceptable reliability, indicating a consistent measurement structure. These findings validate the use of these latent variables in further statistical analyses to explore their impact on consumers' perceptions of local food.

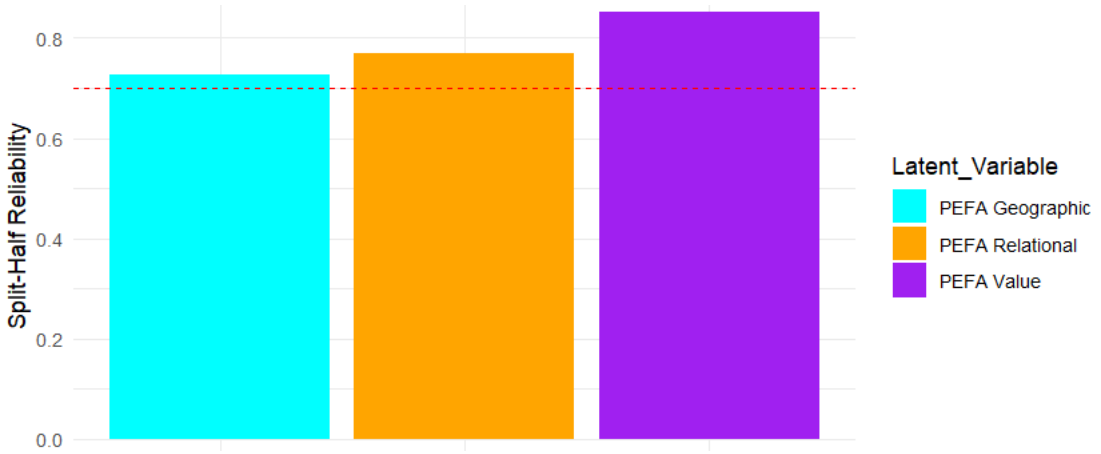



*Figure 28 Internal consistency of proximity latent variables for post validation: split-half reliability*

Source: *Own calculation using R Studio with the psych and ggplot2 packages*

Following the initial reliability assessment of the proximity constructs, the split-half reliability analysis was also conducted on the finalized latent variables (used in the research). This step ensures that the refined constructs maintain a consistent measurement structure, validating their internal reliability before further statistical modeling. The results indicate that value latent variable (0.852) exhibits the strongest internal consistency, confirming that its indicators measure a well-defined construct. The relational (0.769) and geographic value latent variables (0.726) also demonstrate acceptable reliability, exceeding the commonly used threshold of 0.7. All three latent variables are statistically reliable and can be confidently used in further analyses. Overall, the finalized constructs effectively capture the conceptual dimensions of consumer perceptions related to value, relational, and geographic proximity, supporting their use in the study of local food preferences.

### Temporal reliability

### Spearman's rank correlation

Spearman's rank correlation coefficient (ρ) is a non-parametric measure that assesses the strength and direction of the monotonic relationship between two variables. In this case, it was used to examine the consistency of participants' item-level responses between two time points in a test–retest reliability context. Spearman's ρ evaluates whether the *relative ranking of answers* is preserved over time. This makes it particularly useful when working with ordinal data, such as Likert scales. I calculated Spearman's ρ to gain insight into individual-level response consistency, especially for items where absolute agreement may be difficult to achieve. A high Spearman's ρ indicates that a participant responded in a systematically consistent pattern over time.

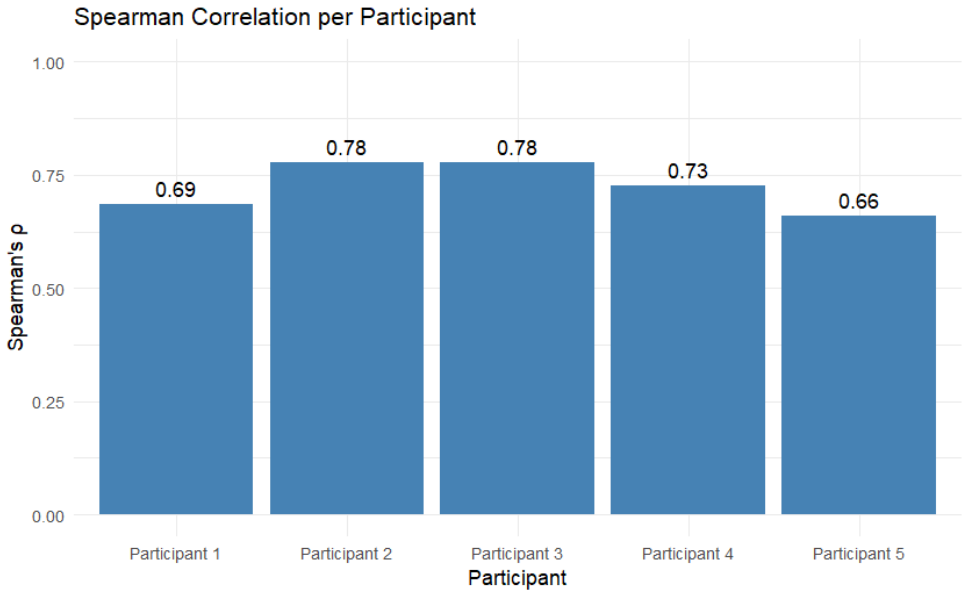



*Figure 29 Spearman's ρ values by participant in the post-validation test–retest study*

Source*: Own calculation using cor(method = "spearman") in R*

Spearman correlation values ranged from 0.66 (Participant 5) to 0.78 (Participants 2 and 3). All values fall within the moderate-to-strong range, suggesting reasonably high internal stability in participants' item rankings. This confirms that, despite some variation in raw scores, participants generally maintained consistent relative preferences or perceptions across time. This supports the test–retest reliability of the measurement instrument on an individual level, particularly in terms of ordinal stability.

**Bland–Altman plot**

The Bland–Altman plot is a method used to assess the agreement between two measurements by visualizing the average of the two scores against their difference. It is useful for identifying systematic bias and random error between test and retest values.

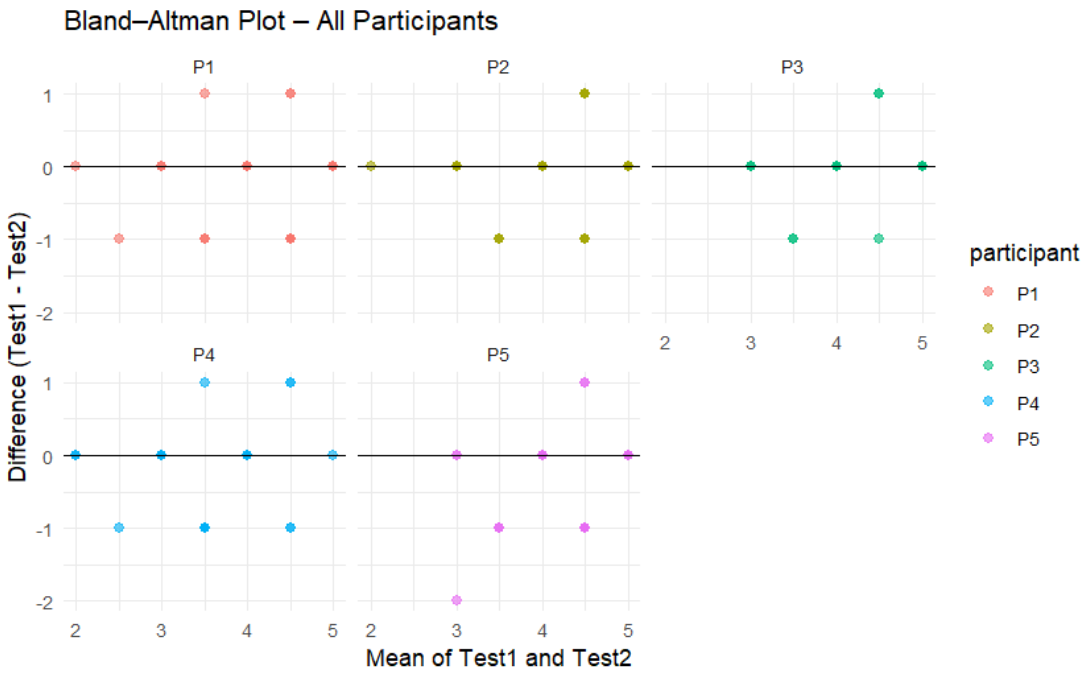



*Figure 30 Bland–Altman plots for test–retest agreement across five participants (post validation)*

Source*: Own calculation using R (packages: dplyr, ggplot2, readxl) based on post-validation data*

Figure 30 shows Bland–Altman plots for all five participants in the post-validation phase of the test–retest reliability assessment. The horizontal line at 0 represents perfect agreement. Most data points are near this line, indicating consistent responses across the two measurement occasions.

Participant 1 and 2 display minimal and balanced deviations. Participant 3 shows a few outliers, though most points are close to the mean. Participant 4 and especially Participant 5 show slightly greater disagreement, with Participant 5 exhibiting differences exceeding –1.5 on some items. While most participants show good agreement between tests, the increased variability for some individuals (notably Participant 5) suggests possible individual instability. The overall consistency supports the reliability of the measurement instrument.

**Average absolute difference per item**

This bar chart presents the average absolute difference per item (Mean deviance) across all five participants in the test–retest reliability check. Each bar represents a survey item, and the height reflects the average of the absolute differences between the test and retest responses. The goal is to evaluate the stability of each item over time—items with lower mean deviance are more stable and thus more reliable.

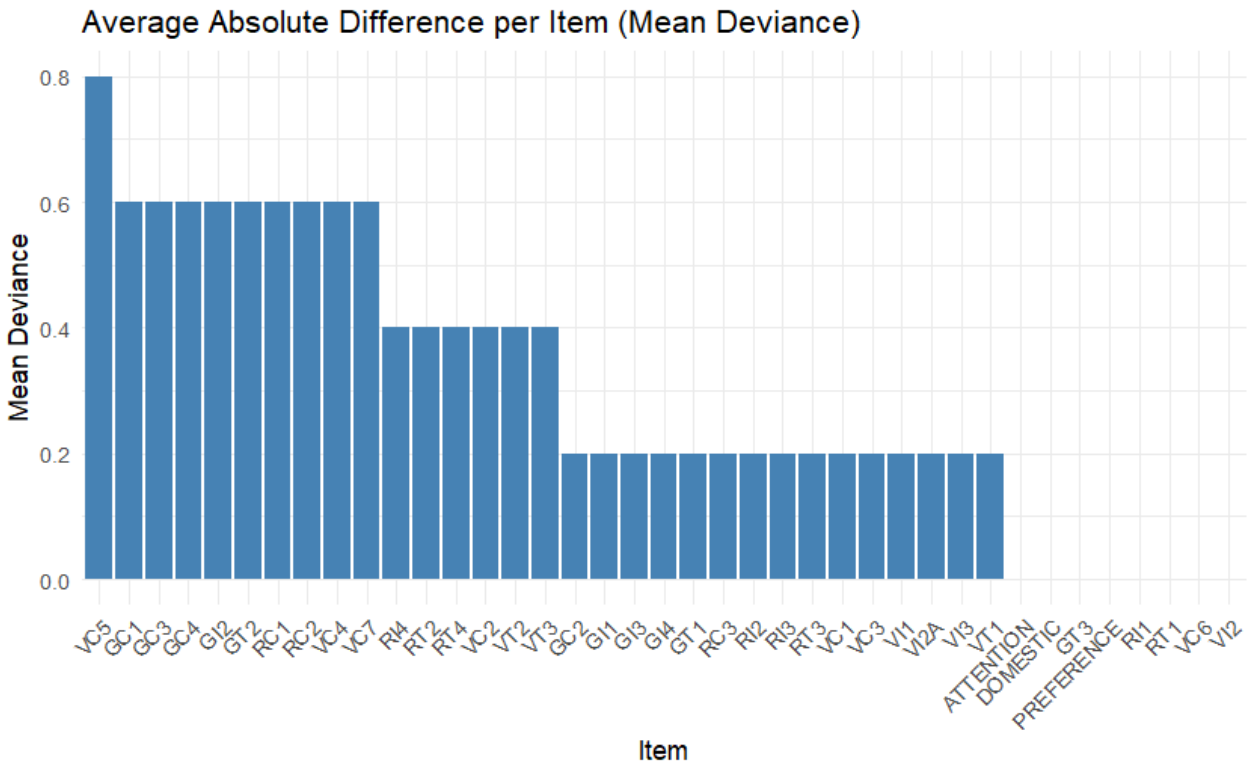



*Figure 31 Mean absolute difference per item based on test–retest responses (n = 5 participants) post validation*

Source*: Own calculation using R (packages: dplyr, ggplot2, readxl) from post-validation dataset*

The plot shows that most items have a mean deviance below 0.6, with a few exceptions such as **VC5** and **GC3**, which exhibit higher variability between test and retest, but still below 1 point on the 5 point Likert scale. All items demonstrate acceptable test–retest consistency.

**Validity**

**Construct validity – Confirmatory Factor Analysis (CFA)**

To assess the construct validity of the scale, Confirmatory Factor Analysis (CFA) was conducted using the lavaan R package, applying Maximum Likelihood estimation with robust standard errors (MLR) and Full Information Maximum Likelihood (FIML) to handle missing data.

Two competing models were evaluated; **a three-factor model**, corresponding to the hypothesized structure of value-based, relational, and geographic proximity; and a **one-factor model**, representing a general proximity factor.

Model fit indices supported the **three-factor structure**:

- **CFI = 0.915**, **TLI = 0.902** (above the 0.90 threshold for acceptable fit)
- **SRMR = 0.050** (acceptable, < 0.08)
- **Robust RMSEA = 0.081** with a 90% CI [0.075, 0.088] (borderline, but still interpretable as moderate fit)
- Compared to the one-factor model (**CFI = 0.719**, **RMSEA = 0.148**), the three-factor model showed substantially better fit.
- **AIC and BIC values** were also lower for the three-factor solution (ΔAIC = -1591.36; ΔBIC = -1577.44), indicating better parsimony.

**I have conducted both comparisons: a non-nested 1- vs 3-factor comparison via AIC/BIC; and a nested test by constraining all inter-factor correlations to 1 in the three-factor model ($\Delta\chi^2 = 105.85$; df = 3; $p < 0.001$), confirming empirically distinct constructs.**

To further validate the multidimensionality assumption, I have conducted both comparisons: a non-nested 1- vs 3-factor comparison via AIC/BIC; and a nested test by constraining all inter-factor correlations to 1 in the three-factor model ($\Delta\chi^2 = 105.85$; df = 3; $p < 0.001$), confirming empirically distinct constructs, reinforcing the theoretical differentiation of the three proximity dimensions.

### Convergent validity

To assess convergent validity, Average Variance Extracted (AVE) and Composite Reliability (CR) values were calculated for each latent factor based on the standardized factor loadings obtained from the confirmatory factor analysis (CFA). According to the widely accepted thresholds, AVE should exceed 0.50, and CR should be at least 0.70.

*Table 39 CR and AVE for latent constructs*

| Latent Factor | CR | AVE |
|---|---|---|
| Value Proximity | 0.920 | 0.622 |
| Relational Proximity | 0.881 | 0.599 |
| Geographic Proximity | 0.845 | 0.478 |

*Source: Own calculation based on confirmatory factor analysis using the lavaan package in R.*

CR values for all three constructs were well above the 0.70 threshold, indicating strong internal consistency. AVE values exceeded the 0.50 threshold for Value and Relational proximity, confirming sufficient convergent validity. However, the AVE for the Geographic factor was slightly below the ideal cutoff (0.478).

Despite this, the CR remained high (0.845), suggesting that while the variance captured by the items is slightly limited, the construct still demonstrates acceptable reliability and **borderline** convergent validity. Discriminant validity is supported by HTMT results (< .85 across all factor pairs), indicating adequate separation among proximities. The results confirm adequate convergent validity for two of the three constructs and acceptable reliability for all three.

### Face and content validity – Qualitative feedback

### Consumer interviews

Following the second round of test-retest validation, informal follow-up discussions were held with the participants to gather feedback on the questionnaire. Respondents appreciated the short length of the survey, highlighting its two-page format as a positive feature. They described the questionnaire as comfortable and easy to complete and found the topics engaging and thought-provoking. While most feedback was positive, some participants mentioned a sense of redundancy in a few areas, suggesting potential overlaps. Nevertheless, they acknowledged that this did not hinder their willingness to respond and that the questionnaire structure was clear and logical. This feedback supports the usability and relevance of the survey instrument in future data collection.

**Farmer's interview**

To validate and refine the conceptual framework of proximity in local food systems, I have conducted interviews with 38 small-scale food producers (20 from Hessen, Germany, and 18 from Hungary) as part of our qualitative research. These post-validation interviews aimed to explore how producers interpret and prioritize the three key proximity dimensions (geographic, relational, and value-based) in the context of local food systems. Specifically, I have asked producers to reflect on what they consider most important in local food and to rank a series of attributes, from one angle the three proximities, and from another angle the trust, cultural and region-specific characteristics and systematic benefits (under publication as László, Csizmadiáné Czuppon, and Michalec, 2025).

Geographic proximity, or the importance of short distances between production and consumption, was acknowledged by nearly all producers as a foundational aspect of local food. Most defined "local" within a 20 to 50 km range, consistent with the JRC's guideline. However, many highlighted that **geographic nearness only becomes meaningful when accompanied by direct relationships or shared values**. As one German producer put it, "*Being close doesn't count if they don't know who we are*."

Relational proximity emerged as the most influential factor in producers' day-to-day experiences. When asked to rank importance, many placed **personal relationships and consumer trust at the top**. The ability to sell directly at markets or through CSA systems was seen as not only economically vital but emotionally rewarding. As one Hungarian producer explained: "*My customers return because they trust me—not because I'm geographically the closest*".

Value-based proximity was often discussed in relation to product quality, sustainability, and cultural identity. Producers noted that consumers buy local not just for freshness, but because they associate these products with healthier options, regional traditions, or environmentally friendly practices. For example, producers offering plastic-free packaging, additive-free processing, or traditional recipes reported that such values created a strong bond with their customers. "*They know what we stand for, and that's why they support us*" summarized one respondent.

Overall, these post-validation interviews reaffirm that proximity is not a single-dimensional concept. Instead, local food systems thrive where spatial nearness, interpersonal trust, and value alignment intersect. Small-scale producers perceive and actively shape these dimensions in their everyday practices, confirming the relevance and real-world application of the geographic, relational, and value-based proximity framework.

**Summary of the validation process**

The scale development process followed a two-phase validation procedure, including pre-validation and post-validation. The pre-validation phase primarily served to refine the questionnaire structure and item pool through expert reviews, test–retest measurements, and a pilot. The post-validation phase involved a larger sample and more robust statistical techniques to finalize the scale, as well as farmers and consumers interview, test-retest measurements.

While test–retest reliability was assessed during both phases, only the post-validation phase incorporated full item analysis and factor-analytic methods. Confirmatory factor analysis (CFA) was conducted during the post-validation phase, once the item pool was refined. Exploratory factor analysis (EFA), including both Varimax and Promax rotations, played a key role in the final structure of the scale. Post-validation reliability indicators demonstrated strong internal consistency across the three proximity dimensions, with Cronbach's alpha values exceeding 0.87 in all cases. Item analyses confirmed sufficient item discrimination and appropriate item difficulty. The scale's convergent validity was supported by satisfactory Average Variance Extracted (AVE) and Composite Reliability (CR) values for all constructs, with CRs above the 0.70 threshold and AVE values above or close to the recommended 0.50 cutoff (Geographic ≈ 0.48). Discriminant validity was supported by HTMT < .85 across all factor pairs.

In comparison to the pre-validation results, the post-validation phase showed marked improvement in both the psychometric clarity of the constructs and the overall consistency of measurement. The revised scale thus fulfills the criteria of a reliable and valid measurement instrument, providing a stable basis for further analysis of perceived proximity in the context of local food consumption. Some limitations should be noted: the test–retest sample size remained modest, and the geographic dimension exhibited slightly lower AVE values, which suggests room for further refinement in future applications. Still, the scale meets established psychometric standards and supports its use in research settings.

## 10.2 Appendix 2: The finalised CPLF questionnaire

Based on face validation, test-retest reliability, and the pilot test (including item analysis, structural analysis, and reliability assessment), a final version of the questionnaire has been developed. In this research, we do not differentiate according to both classification logics but instead focus on the first one, examining the three types of proximity. Therefore, the goal is to measure three latent variables. The original survey was conducted in Hungarian, meaning that the translation process may introduce certain discrepancies. While every effort has been made to ensure accuracy and consistency, some nuances or contextual differences may arise. The items were mixed in the consumer survey.

**VALUE PROXIMITY**

**Consumer trust**

- **VT1: I think local food is healthier compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... egészségesebb*
- ***VT2*: I think local food is safer compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... biztonságosabb*
- ***VT3*: I think local food is more reliable, quality-wise, compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... megbízhatóbb minőségű*

**Culture- or region-specific attributes**

- **VC1: I think local food is fresher compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... frissebb*
- **VC2: I think local food is tastier compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... finomabb*
- **VC3: I think local food is of higher quality compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... magasabb minőségű*
- **VC4: I think local food is based more on traditional recipes and ingredients compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... hagyományos recepteken és összetevőkön alapul*
- **VC5: I think local food uses authentic patterns, shapes, and colors compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... autentikus mintákat, formákat és színeket használ*
- **VC6: I think local food is a handcrafted product compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... kézműves termék*
- **VC7: I think local food is more expensive compared to other food products.**
- *Szerintem a helyi élelmiszer más élelmiszerekhez képest... drágább*

**Systematic benefits**

- **VI1: I think local food is more sustainable and considers environmental awareness compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... fenntarthatóbb, környezettudatosabb*
- **VI2: I think local food uses less packaging compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... kevesebb csomagolóanyaggal jár*
- **VI2a: I think local food uses environmentally friendly materials for packaging compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... környezetbarát anyagokat használnak a csomagoláshoz*
- **VI3: In the case of local food, I can have more influence on product design, and it can be more customized to one's needs.**
  *Szerintem a helyi élelmiszer esetében nagyobb befolyásom lehet a termék tervezésére, igényre szabottabb lehet*

**RELATIONAL PROXIMITY**

**Consumer trust**

- **RT1: I have more trust in food products that I can buy directly from the producer.**
  *Jobban megbízom azokban az élelmiszerekben, amelyeket közvetlenül a termelőtől lehet beszerezni*
- **RT2: I think local food is more reliable compared to other food products because I can get it from the person who produces it.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... megbízhatóbb, mert attól tudom beszerezni, aki előállítja azt*
- **RT3: I think local food producers are more reliable than other producers.**
  *Szerintem a helyi élelmiszer termelői megbízhatóbbak, mint más előállítók*
- **RT4: I think local food producers are more credible than other producers.**
  *Szerintem a helyi élelmiszer termelői hitelesebbek, mint más előállítók*

**Culture- or region-specific attributes**

- **RC1: I think local food is produced by farmers of Hungarian nationality.**
  *Szerintem a helyi élelmiszer... Magyar nemzetiségű termelők által készül.*
- **RC2: I think, by preferring local food, I can support small-scale producers compared to other foods.**
  *Szerintem a helyi élelmiszer előnyben részesítésével támogatom a kistermelőket, szemben más élelmiszerekkel.*

- **RC3: I think local food better reflects the region and its people's heritage compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... jobban tükrözi a régió, és az ott élők örökségét.*

**Systematic benefits**

- **RI1: When buying local food, I can directly ask the producer compared to other food products.**
  *Szerintem a helyi élelmiszer esetében közvetlenül kérdezhetek az előállítójától, szemben más élelmiszerekkel.*
- **RI2: I feel that buying local food makes me part of a community.**
  *Szerintem a helyi élelmiszer vásárlásával egy közösséghez tartozom.*
- **RI3: In the case of local food, profits go directly to local farmers, compared to other food products.**
  *Szerintem a helyi élelmiszer esetében a nyereség közvetlenül a helyi termelőkhöz kerülhet, szemben más élelmiszerekkel.*
- **RI4: When buying local food, I can be in direct contact with the producer.**
  *Szerintem a helyi élelmiszer esetében közvetlen kapcsolatban lehetek a termelővel.*

**GEOGRAPHIC PROXIMITY**

**Consumer trust**

- **GT1: The closer a food product is produced, the more reliable it is.**
  *Minél közelebb állítanak elő egy élelmiszert, annál megbízhatóbb.*
- **GT2: I think local food is more reliable because I know where it comes from compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... megbízhatóbb, mert tudom, honnan származik.*
- **GT3: I think local food is more transparent in its geographic journey to me compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... átláthatóbb földrajzi úton jut el hozzám.*

**Culture- or region-specific attributes**

- **GC1: The food produced in my area is better than the ones produced in other places.**
  *Ahol élek, ott jobb élelmiszereket állítanak elő, mint más helyeken.*
- **GC2: I think local food is more often seasonal compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... gyakrabban szezonális termék.*

- **GC3: I think local food better reflects the region and region's culture compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... jobban tükrözi a régió, a hely kultúráját.*
- **GC4: I think local food is made using ingredients sourced from the region compared to other food products.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... a régióból származó alapanyagok felhasználásával készül.*

**Systematic benefits**

- **GI1: The closer a food originates, the less environmental harm it causes.**
  *Minél közelebbről származik egy élelmiszer, annál kisebb kárt okoz a környezetben.*
- **GI2: Local food is easier to obtain due to the shorter distance.**
  *Szerintem a helyi élelmiszer... könnyebben beszerezhető a kis távolság miatt.*
- **GI3: I think local food is more sustainable because it has to travel less to reach consumers.**
  *Szerintem a helyi élelmiszer más élelmiszerekhez képest... fenntarthatóbb, mert kevesebb utat kell megtennie a fogyasztóhoz.*
- **GI4: By purchasing local food, I can support the region's economic development.**
  *Szerintem a helyi élelmiszer... vásárlásával tudom támogatni a régió gazdaságfejlesztését.*

*Table 40 Summary of initially proposed variables*

| | Consumer trust | Culture or region-specific attributes | Systematic benefits | **Total number** |
|---|---|---|---|---|
| Value proximity | VT1, VT2, VT3 | VC1, VC2, VC3, VC4, VC5, VC6, VC7 | VI1, VI2, VI2a, VI3 | **14** |
| Relational proximity | RT1, RT2, RT3, RT4 | RC1, RC2, RC3 | RI1, RI2, RI3, RI4 | **11** |
| Geographic proximity | GT1, GT2, GT3 | GC1, GC2, GC3, GC4 | GI1, GI2, GI3, GI4 | **11** |
| **Total number** | **10** | **14** | **12** | **36** |

Source: *Self-edited table*

## 10.3 Appendix 3: Pilot research questionnaire in Hungarian (pre-validation)

Kedves Kitöltő! László Veronika vagyok, a Pannon Egyetem doktorandusz hallgatója, és a kutatásomban helyi élelmiszerekkel foglalkozom. Az adatokat név nélkül, és tudományos célra használom fel. A kérdőív őszinte kitöltésével nagyban segíti a munkámat, köszönöm!

*Kérem döntse el, hogy mennyire ért Ön egyet az alábbi állításokkal! (1: nem ért egyet; 5: teljes mértékben egyet ért)* **1 2 3 4 5**

| | | | | | |
|---|---|---|---|---|---|
| Vásárláskor megnézem, hogy honnan származik az élelmiszer. | | | | | |
| Minél közelebbről származik egy élelmiszer, annál kisebb a környezeti lábnyoma. | | | | | |
| A magyar élelmiszer helyi élelmiszer. | | | | | |
| A helyi élelmiszert jobban kedvelem, mint más élelmiszereket. | | | | | |
| Az én régiómban termelt élelmiszerek jobbak, mint más élelmiszerek. | | | | | |

*Döntse el, hogy az alábbi állításokkal milyen mértékben ért egyet! (1: nem ért egyet; 5: teljes mértékben egyetért)*

**Szerintem a helyi élelmiszer... 1 2 3 4 5**

| | | | | | |
|---|---|---|---|---|---|
| több fenntartható tulajdonsággal rendelkezik, mint más élelmiszerek. | | | | | |
| frissebb, mint más élelmiszerek. | | | | | |
| egészségesebb, mint más élelmiszerek. | | | | | |
| biztonságosabb, mint más élelmiszerek. | | | | | |
| megbízhatóbb, mert attól tudom beszerezni, aki előállítja azt. | | | | | |
| termelők hitelesebbek, mint más elállítók. | | | | | |
| fogyasztása kevésbé kockázatos, mint más élelmiszereké. | | | | | |
| megbízhatóbb, mint más élelmiszerek. | | | | | |
| esetében közvetlenül kérdezhetek az előállítójától, szemben más élelmiszerekkel. | | | | | |
| esetében inkább egy vásárlói közösséghez tartozom, mint más élelmiszerek vásárlásával. | | | | | |
| jobban tükrözi a régió örökségét, kultúráját, mint más élelmiszerek. | | | | | |
| nagyobb valószínűséggel alapul hagyományos recepteken és összetevőkön, mint más élelmiszerek. | | | | | |
| esetében nagyobb befolyásom lehet a termék tervezésére, mint más élelmiszerek esetében. | | | | | |
| nagyobb valószínűséggel használ autentikus mintákat, formákat, színeket, mint más élelmiszerek. | | | | | |
| személyre szabhatóbb, mint más élelmiszerek. | | | | | |
| megbízhatóbb, mert jobban megbízom azokban az élelmiszerekben, amelyeket közvetlenül a termelőtől lehet vásárolni, mint más élelmiszerekben. | | | | | |
| kevesebb csomagolóanyaggal jár, vagy autentikus anyagokat használnak a csomagoláshoz. | | | | | |
| gyakrabban szezonális termék, mint más élelmiszerek. | | | | | |
| azért megbízhatóbb, mint más élelmiszerek, mert tudom, honnan származik. | | | | | |
| finomabb és magasabb minőségű, mint más élelmiszerek. | | | | | |
| megbízható, mert minél közelebb állítanak elő egy élelmiszert, annál megbízhatóbb. | | | | | |
| termelők megbízhatóbbak, mint más előállítók. | | | | | |
| magyar termelők által készül. | | | | | |
| esetében a nyereség a közvetlenül a helyi termelőkhöz kerülhet, szemben más élelmiszerekkel. | | | | | |

**Ön szerint a helyi élelmiszer maximum hány km messziről származik? ..... km**

**Évente körülbelül hány darab helyi élelmiszert vásárol? ..... db**

**Milyen helyi élelmiszert vásárolt legutóbb? .....**

**Hány százalékkal hajlandó többet fizetni egy helyi élelmiszerekért, mint más hasonló termékért? .....%**

*Döntse el, hogy az alábbi állításokkal milyen mértékben ért egyet! (1: nem ért egyet; 5: teljes mértékben egyet ért)*

| **Szerintem a helyi élelmiszer...** | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| jobban igazodik az egyén ízléséhez, mint más élelmiszerek. | | | | | |
| átláthatóbb földrajzi úton jut el hozzám, mint más élelmiszerek. | | | | | |
| a régióból származó alapanyagok felhasználásával készül. | | | | | |
| előnyben részesítésével jobban támogatom a kistermelőket, mint más élelmiszerek esetében. | | | | | |
| fenntarthatóbb, mert kevesebb utat kell megtennie a fogyasztóhoz, mint más élelmiszereknek. | | | | | |
| kézműves termék. | | | | | |
| könnyebben beszerezhető a kis távolság miatt, mint más élelmiszerek. | | | | | |
| gyakrabban szezonális termék, mint más élelmiszerek. | | | | | |
| az évszak szerint változó kínálatot biztosít, szemben más élelmiszerekkel. | | | | | |
| vásárlásával jobban tudom támogatni a régió gazdaságfejlesztését, mint más élelmiszerekkel. | | | | | |
| esetében kapcsolatban lehetek a termelőkel, ellentétben más élelmiszerek esetében. | | | | | |
| megbízható, mert jobban megbízom a közelemben előállított élelmiszerekben. | | | | | |

**Demográfiai adatok**

| | | |
|---|---|---|
| **Ön neme:** | ❑**Férfi** ❑ **Nő** | |
| **Születési év:** | | |
| **Állandó lakcím (irányítószám):** | | |
| **Az Ön gazdasági státusza** | ❑ Aktív dolgozó (munkavállaló) | ❑ Munkakereső |
| | ❑ Vállalkozó (önfoglalkoztató) | ❑ Háztartásbeli, GYES-GYED |
| | ❑ Nyugdíjas, rokkantnyugdíjas | ❑ Diák |

## 10.4 Appendix 4: Face validity questionnaire in English (pre-validation)

Name, affiliation: _____

Date: _____

The primary objective of the questionnaire is to measure three variables: value proximity, relational proximity, and geographical proximity in consumer perception. Specifically, it aims to understand what 'local' means for food products from the consumer's perspective. Additionally, the components of these concepts are evaluated separately, accompanied by comments.

**Evaluation Criteria:**

- Are the questions relevant to the measurement objective?
- Does the measurement method seem useful for assessing the variable?
- Does the measurement appear appropriate for capturing the variable?

**VALUE PROXIMITY**

Measurement objective: Assessing value proximity. According to Eriksen (2013), value proximity refers to the different values attributed to local foods by various stakeholders (typically product-related attributes).

**Evaluation and opinion: Acceptable? Yes / Modified / No, detailed opinion**

I believe that local food... (1: strongly disagree; 5: strongly agree)

- Health VT1 - Healthier than other food products.
- Safety VT2 - Safer than other food products / VT2a - Less risky to consume compared to other food products.
- Product trust VT3 - More reliable than other food products.
- Heritage and ethnic identity VC1 - Better reflects the heritage and culture of the region than other food products.
- Tradition and authenticity VC2 - More likely to be based on traditional recipes and ingredients than other food products. / VC2a - More likely to use authentic patterns, shapes, and colors than other food products.
- Quality VC3 - Fresher than other food products. / VC3a - Tastier and of higher quality than other food products.
- Sustainable product characteristics VI1 - Has more sustainable attributes than other food products. / VI1a - Uses less packaging or utilizes authentic materials for packaging.
- Personalization VI2 - Better tailored to individual tastes than other food products.
- VI2a - A handcrafted product.

**Overall impression (in terms of value proximity measurement):**

**RELATIONAL PROXIMITY**

Measurement Objective: Measuring relational proximity, which refers to consumers' relationships with producers or other consumers. According to Eriksen (2013), direct relationships between local actors (such as producers, distributors, retailers, and consumers) are re-established through alternative production and distribution practices, such as farmers' markets, farm shops, cooperatives, box schemes, and food networks.

**Evaluation and opinion: Acceptable? Yes / Modified / No, detailed opinion**

I believe that local food... (1: strongly disagree; 5: strongly agree)

- Direct relationship with the producer RT1 – More reliable, as I trust food purchased directly from the producer more than other foods. / RT1a – More reliable because I can obtain it from the person who produces it.
- Producer reliability RT2 – Producers are more authentic than other manufacturers. / RT2a – Producers are more trustworthy than other manufacturers.
- Nationality RC1 – Produced by Hungarian producers. / RC1a – Made using ingredients sourced from the region.
- Support for local producers RC2 – By preferring local food, I support small-scale producers more than in the case of other foods.
- REL: Shortening the supply chain RC3 – In the case of local food, profits can go directly to local producers, unlike other food products.
- Being connected RI1 – With local food, I can connect with the producer, unlike with other foods. / RI1a – I can directly ask the producer about the product, unlike with other foods.
- Consumer community RI2 – Purchasing local food makes me feel more part of a buyer community than purchasing other foods.
- Co-creation and joint product development RI3 – With local food, I have greater influence over product design than with other foods. / RI3a – More customizable than other foods.

**Overall impression (in terms of measuring relational proximity):**

## GEOGRAPHICAL PROXIMITY

Measurement Objective: Measuring geographical proximity. Geographical proximity (e.g., area, community, place, or geographical boundary) refers to the distance and/or radius (e.g., food miles) within which food production, retail, consumption, and/or distribution takes place, according to Eriksen (2013).

**Evaluation and opinion: Acceptable? Yes / Modified / No, detailed opinion**

I believe that local food... (1: strongly disagree; 5: strongly agree)

- Transparency GT1 – More reliable than other foods because I know where it comes from. / GT1a – Reaches me through a more transparent geographical route than other foods.
- Distance GT2 – Reliable because the closer food is produced, the more trustworthy it is. / GT2a – Reliable because I trust food produced near me more than other foods.
- Ethnocentrism GC1 – Food produced in my region is better than other foods.
- Seasonality GC2 – More often a seasonal product than other foods. / GC2a – Provides a seasonally changing selection, unlike other foods.
- Regional support GC3 – By purchasing local food, I support regional economic development more than with other foods.
- Sustainable supply chain GI1 – The closer a food originates, the smaller its environmental footprint. / GI1a – More sustainable because it requires less transportation to reach the consumer compared to other foods.
- Availability GI2 – Easier to obtain due to the short distance, compared to other foods.

**Overall impression (in terms of measuring geographical proximity):**

## ADDITIONAL INDICATORS

**Evaluation and opinion: Acceptable? Yes / Modified / No, detailed opinion**

- Attention ATT – When purchasing food, I check where it comes from. (1-5)
- Preference PREF – I prefer local food more than other foods. (1-5)
- Domestic origin DOM – Hungarian food is local food. (1-5)
- Real distance KM – The local food comes from a maximum distance of … km
- Frequency Y – Approximately how many local food products do you purchase per year?
- Willingness to pay (WTP) WTP – How much more are you willing to pay for local food compared to similar products? (%)

## 10.5 Appendix 5: Detailed calculations (R-Studio)

The statistical analyses supporting this dissertation were conducted using RStudio, covering various stages of the research process. The outputs include the empirical research related to consumer perceptions of local food through different types of proximity. These materials ensure the transparency of the quantitative procedures applied throughout the study. The corresponding R scripts and HTML outputs have been made accessible upon request via Zenodo, under the following link:

Laszlo, V. (2025). Empirical research (R-Studio) – The consumer perception of local food through different types of proximity. *Zenodo*. https://doi.org/10.5281/zenodo.17084462