

Food Safety Trust and Willingness to Pay for Local Food among Consumers in Saudi Arabia

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Research Article

Keywords: local food, confidence, willingness to pay, price transparency, food systems, sustainability

Posted Date: October 8th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10855496/v1>

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Additional Declarations: No competing interests reported.

Abstract

Food systems represent more than sources of nutrition; they embody cultural identity, heritage, and sustainability. As global interest in locally produced food grows, the drivers of consumers' willingness to pay (WTP) a premium remain underexplored in emerging markets such as Saudi Arabia. This study investigates how consumer confidence, perceived proximity, and past purchasing behavior shape WTP for local food, with particular attention to the moderating role of price transparency. Drawing on Social Identity Theory and the Theory of Planned Behavior, a quantitative survey of 317 Saudi consumers was analyzed using structural equation modeling. Results show that relational and process proximities significantly enhance consumer confidence, which in turn increases WTP, while identity and access proximities exert weaker effects. Price transparency and past purchasing behavior further strengthen these relationships. The findings extend the literature on consumer behavior, food culture, and sustainability by highlighting how fostering consumer trust and transparent practices can support ethical consumption, sustainable local food systems, and cultural heritage within the framework of Saudi Arabia's Vision 2030.

1. Introduction

Food is much more than nutrition; it embodies sociocultural identities, territorial heritage, and community belonging. It reflects historical traditions, contemporary lifestyles, and the interplay between production, consumption, and sustainability (Fonte, 2010; Bessi re, 2013). Local food systems contribute to cultural preservation, agricultural and livestock biodiversity, and resilient food networks, while simultaneously supporting ethical consumption and sustainable development. Globally, local food is valued not only for quality and environmental benefits but also as a marker of identity, heritage, and place-based authenticity (Everett & Aitchison, 2008; Sims, 2009).

In Saudi Arabia, local food carries dual significance: it preserves cultural and gastronomic heritage while fostering sustainable agricultural practices and food security. Traditional products, such as dates, dairy, and region-specific culinary practices, are intertwined with local customs and tourism experiences, supporting regenerative tourism initiatives that position gastronomy as both a cultural and economic asset (AlHussaini et al., 2023). Understanding consumer motivations to pay a premium for local products is therefore crucial for reinforcing these systems and ensuring their sustainability.

Consumers' willingness to pay (WTP) a premium for local food reflects economic, ethical, and cultural motivations. Trust, perceived quality, community attachment, and perceived proximity to producers strongly influence WTP (Zepeda & Deal, 2009; Thilmany & Watson, 2020; Aschemann-Witzel et al., 2021). Proximity encompasses multiple dimensions: relational (social ties with producers), process (familiarity with production methods), identity (cultural or regional affiliation), and access (ease of obtaining the product). Each dimension shapes perceptions of authenticity, quality, and ethical engagement, ultimately influencing purchasing decisions.

Despite growing attention to local food systems, gaps remain in understanding how consumer confidence mediates proximity's effects on WTP, and how past purchasing behavior and price transparency moderate these dynamics, particularly in non-Western contexts such as Saudi Arabia (Liao et al., 2023). Investigating these mechanisms is essential for developing policies and marketing strategies that support local producers while fostering ethical consumption.

This study draws on two complementary perspectives. Social Identity Theory (SIT) (Tajfel & Turner, 1979) posits that individuals' identification with social or cultural groups influences behaviors, attitudes, and decision-making. Applied to food, SIT suggests that consumers support local food as an in-group choice, reinforcing cultural identity and solidarity with producers.

The Theory of Planned Behavior (TPB) (Ajzen, 1985) emphasizes attitudes, perceived control, and behavioral intentions in shaping actions. In local food contexts, TPB helps explain how consumer confidence mediates the influence of perceived proximity on WTP. Consumers who feel informed, confident, and capable of accessing local products are more likely to act on their preferences, translating into higher WTP.

Local food is a tangible expression of heritage, linking consumption to historical traditions and cultural narratives (Bessière, 2013; Everett & Aitchison, 2008). In Saudi Arabia, traditional foods are increasingly integrated into tourism, supporting regenerative tourism that promotes cultural preservation and local economic development. Gastronomy tourism not only generates revenue for producers but also enhances awareness of food origins, production practices, and sustainability, reinforcing ethical consumption patterns.

Examining relational, process, identity, and access proximities contributes to understanding how food systems, consumer behavior, and cultural heritage interact to shape sustainable consumption. These dynamics have implications for agricultural and livestock biodiversity, as consumer demand can incentivize the preservation of traditional crops and breeds. This aligns with broader sustainability objectives and the UN Sustainable Development Goals (SDG 2: Zero Hunger; SDG 3: Good Health and Well-Being; SDG 12: Responsible Consumption and Production; SDG 17: Partnerships for the Goals).

Price transparency moderates the relationship between consumer confidence and WTP. Transparent pricing assures consumers of fairness, quality, and ethical practices, strengthening trust and encouraging premium purchases. Past purchasing behavior also moderates this relationship; habitual buyers tend to show stronger confidence and WTP due to familiarity, trust, and positive experiences with local producers. These factors are particularly significant in markets like Saudi Arabia, where cultural traditions and community ties influence consumption.

While proximity, trust, and consumer confidence have been studied, few investigations integrate these factors in the Saudi context. Prior research often examines Western markets or individual proximity elements, overlooking combined effects of relational, process, identity, and access proximities. Additionally, moderating effects of price transparency and past purchasing behavior remain underexplored, despite their importance in shaping trust and ethical engagement.

This study addresses these gaps by examining: (1) How consumer confidence mediates the relationship between perceived proximity and WTP. (2) How past purchasing behavior moderates this relationship? (3) How price transparency strengthens consumer confidence and WTP.

By answering these questions, the study contributes theoretically to understanding consumer behavior and locally embedded food systems, and practically by guiding policymakers, producers, and marketers. It demonstrates how trust, transparency, and engagement with cultural and gastronomic heritage can enhance sustainable consumption, cultural preservation, and regenerative tourism in Saudi Arabia.

Ultimately, local food is both an economic commodity and a vehicle for cultural preservation, biodiversity, ethical consumption, and sustainable development. Understanding the interplay of consumer confidence, proximity, and transparency provides insights for designing policies and strategies that reinforce local food systems, support livelihoods, and preserve gastronomic heritage for future generations.

2. Literature Review

2.1. Perceived Proximity and Local Food Consumption

Perceived proximity encompasses physical, emotional, and cultural nearness between consumers and products. In Saudi Arabia, proximity is reinforced by national initiatives such as *Vision 2030*, which promotes economic diversification, self-sufficiency, and support for local industries (Alrobaish, et al., 2021). Recent studies highlight that Saudi consumers increasingly perceive supporting local products as an extension of their national identity (Feldmann, & Hamm, 2015). This cultural and emotional attachment reflects the “country-of-origin effect,” where consumers exhibit stronger trust and preference for products associated with their own nation due to shared identity and pride (Ahmed et al., 2020).

The relationship between proximity and consumer confidence is central in shaping purchasing intentions, especially when moderated by consumer expertise and price transparency (Toukabri, 2021). Proximity not only reflects geographical accessibility but also relational closeness, familiarity, and cultural resonance, all of which reduce perceived risk and strengthen trust (Dubuisson-Quellier, 2009). Consumers with greater expertise are better positioned to assess authenticity and quality, thereby enhancing their confidence in local food choices (De Magistris & Gracia, 2016). Empirical research confirms that the positive impact of proximity on consumer confidence and purchase intention is amplified when both consumer expertise and transparent pricing are present (Jin & Shin, 2020). In the Saudi context, where national pride and consumer expectations for clear communication are reinforced under *Vision 2030*, both cultural proximity and price transparency are critical levers for encouraging willingness to pay (WTP) premiums for local food (Feldmann, & Hamm, 2015).

2.1. Dimensions of Proximity

Proximity can be conceptualized as a multi-dimensional construct that captures the various ways consumers relate to local products and producers. Drawing on Aaker’s (1991) framework, four complementary dimensions of proximity are particularly relevant for understanding consumer behavior in local food markets: Relational Proximity, this dimension reflects the emotional bonds and personal connections consumers develop with local producers, brands, or vendors. Strong relational proximity fosters trust, loyalty, and a sense of belonging, which in turn influences ethical consumption and willingness to pay a premium for local products (Fournier, 1998; Feldmann & Hamm, 2015). Relational proximity emphasizes the importance of interpersonal relationships, direct communication, and community engagement as mechanisms that strengthen consumer confidence. The process proximity captures the extent to which consumers are informed about production methods, including safety standards, sustainability practices, and ethical considerations (Manning et al., 2016). When consumers have visibility into the production process, they perceive greater transparency and control, which enhances trust and the perceived value of local products. This dimension underscores the role of educational initiatives, labeling, farm tours, and digital content in conveying production practices to consumers. The identity proximity pertains to the alignment between local products and cultural, regional, or national identity. Products that reflect local heritage, traditions, or national pride can evoke emotional resonance and reinforce consumer confidence

(Thompson & Arsel, 2004). Identity proximity emphasizes symbolic consumption, where purchasing local food is not only a utilitarian choice but also a reflection of cultural values and social identity. However, as empirical studies suggest, the strength of identity proximity may vary depending on the consumer's personal identification with the local or national culture. The access proximity reflects the ease of obtaining local products, whether through physical markets, retail stores, or digital platforms (Kumar et al., 2020). Greater accessibility empowers consumers to make informed purchasing decisions, reinforces confidence, and reduces barriers to engagement with local food systems. Access proximity also includes factors such as geographic availability, distribution channels, and e-commerce solutions, which are increasingly important in digitally mediated marketplaces.

Collectively, these four dimensions provide a comprehensive framework for understanding how consumers' perceptions of closeness emotional, informational, symbolic, and practical shape their confidence in local food products and their willingness to pay a premium. Recognizing the multi-faceted nature of proximity allows researchers and practitioners to design targeted interventions that enhance consumer engagement, trust, and sustainable purchasing behaviors in local food markets.

Together, these four dimensions explain how local food systems build trust and confidence among consumers, thereby influencing WTP for local products.

2.1.1. Proximity of Access: Ease of Access to the Point of Sale

Access to local products via physical stores, farmers' markets, or online platforms has significantly shaped consumer confidence in Saudi Arabia (Toukabri & Ghali, 2020). With rapid urbanization and investments in logistics, access to local food has expanded, particularly through e-commerce platforms promoted under *Vision 2030* (Alshammari, 2020). Empirical evidence confirms that easier access positively influences purchase decisions and strengthens consumer trust (Innes & Hobbs, 2011).

Hypothesis H1. The ease of access to local products positively influences consumer confidence in local products.

2.1.2. Relational Proximity: Interaction with the Producer

Relational proximity emphasizes trust-based connections between producers and consumers (Toukabri, 2023). Historically, traditional marketplaces (*souks*) in Saudi Arabia enabled strong relationships that built confidence in local goods (Al-Otaibi & Al-Rashid, 2022). Today, digital platforms and social media extend this relational proximity, allowing producers to engage directly with consumers, enhancing transparency and authenticity (Lenglet & Muller, 2016). Such interactions are particularly valued by younger generations who seek proof of ethical and cultural authenticity.

Hypothesis H2. Strong relational proximity between producers and consumers positively influences consumer confidence in local products.

2.1.3. Proximity of Identity: Shared Values and Local Identity

Identity proximity refers to the alignment between local products and consumers' cultural, religious, and national values. In Saudi Arabia, *Vision 2030* promotes local production as a symbol of national pride and cultural continuity (Al-Tayyar, 2021). Purchasing local goods is also linked to Islamic values such as sustainability, fairness, and community solidarity (Ahmed et al., 2020). According to self-congruity theory (Sirgy, 1982),

consumers prefer products that resonate with their self-image and cultural identity, which in turn enhances confidence.

Hypothesis H3. The alignment of local products with cultural and national identity positively influences consumer confidence in local products.

2.1.4. Proximity of Process: Understanding the Production Process

Process proximity highlights transparency regarding production practices. Rising concerns over food safety, traceability, and sustainability have made Saudi consumers more attentive to production details (Alshammari, 2020). Knowledge of ethical sourcing, safety standards, and sustainable farming practices reinforces consumer trust and strengthens their support for local producers (Herauld-Fournier & Pouzenc, 2014).

Hypothesis H4. Greater transparency in the production process positively influences consumer confidence in local products.

2.2. The Role of Consumer Confidence in Willingness to Pay

Consumer confidence is a pivotal driver of WTP for local food. Dimensions of proximity access, relation, identity, and process shape trust and perceived authenticity, which directly increase consumers' readiness to pay a premium (Toukabri et al., 2019, 2020, 2021). In Saudi Arabia, consumer confidence is reinforced by policies that promote local food security and authenticity under *Vision 2030*.

Studies confirm that trust in local producers (relational proximity), ease of access (access proximity), and cultural alignment (identity proximity) significantly increase WTP (El-Feki & Abu-Zayed, 2023). Research also shows that communication about product origin and production methods enhances transparency and thus strengthens confidence, leading to greater WTP (Alrobaish, et al., 2021).

Hypothesis H5. Consumer confidence positively influences WTP a premium for local food.

2.3. Mediating Role of Consumer Confidence

Consumer confidence mediates the effect of proximity dimensions on WTP. Relational trust, process transparency, cultural identity, and access shape consumers' perceptions, which translate into higher WTP through increased confidence (Toukabri et al., 2019, 2020, 2021). Evidence suggests that stronger proximity enhances emotional bonds, authenticity perceptions, and sustainability recognition, all of which build consumer confidence and drive WTP (Burgess et al., 2022; Brennan et al., 2022; Ginieis et al., 2023).

Confidence also varies across contexts: for some consumers, identity proximity is most salient; for others, process transparency dominates. Hence, understanding confidence as a mediator offers actionable insights for designing effective marketing and policy interventions (Sgroi et al., 2023).

Hypothesis H6. Consumer confidence mediates the relationship between proximity dimensions (relation, process, identity, and access) and WTP for local food.

2.4. Moderating Roles of Past Behavior and Price Transparency

Past behavior and price transparency further shape the proximity–confidence–WTP pathway.

Past behavior strengthens the proximity–confidence link. Consumers with positive prior experiences of freshness, authenticity, and ethical practices develop trust, which encourages repeat purchases and willingness to pay more (Johnson & Browne, 2023; Schmidt et al., 2022). Negative experiences, however, undermine confidence and reduce WTP.

Price transparency provides clarity and fairness in pricing, reinforcing confidence in the value of local food. Transparent pricing reduces uncertainty, validates quality claims, and strengthens consumers' willingness to pay (Wang et al., 2023; Liu et al., 2023). The effect of transparency is especially strong when combined with positive past behavior, as it validates prior decisions and enhances trust.

Hypothesis H7. Past behavior moderates the relationship between consumer confidence and proximity.

Hypothesis H8. Price transparency moderates the relationship between consumer confidence and WTP for local food.

2.5. Conceptual Model and Research Hypotheses

Figure 1 illustrates the proposed conceptual model. Proximity dimensions (relation, process, identity, and access) are expected to enhance consumer confidence, which mediates their effect on WTP for local food. Past behavior and price transparency are introduced as moderators that shape the strength of these relationships.

This model provides a framework for understanding consumer decision-making in Saudi Arabia's local food market, emphasizing the interplay between proximity, confidence, and transparency. It also highlights pathways through which marketers and policymakers can promote local food consumption, strengthen consumer–producer ties, and encourage WTP premiums.

3. Methodology

3.1. Constructs' Operationalization

To evaluate perceived proximity, this study employed the four-dimensional scale initially developed by Bergadaà and Del Bucchia (2009) and subsequently validated by Hérault-Fournier et al. (2010). The functional dimension was removed following empirical testing, given its overlap with utility value. The resulting framework captures relational, process, identity, and access proximities, and has been applied in several studies on local and direct sales outlets, demonstrating high reliability and construct validity (Dufeu & Ferrandi, 2013; Mazières & Gautier, 2015). This scale was deemed particularly appropriate for the Saudi local food context as it has been validated in similar consumer settings.

Consumer confidence was measured using a unidimensional six-item scale developed by Lacoëuilhe and Belaid (2015) and adapted from Amine (1993). This scale has been widely applied across consumer behavior research and is recognized for its internal consistency and robustness in capturing consumer trust and confidence (Delgado-Ballester, 2004).

Price transparency was measured using items adapted from prior research to assess consumers' perceptions of the availability and transparency of pricing information. This operationalization is consistent with the approach adopted by Minbashrazgah et al. (2017), who examined price transparency as a factor influencing consumers'

green purchase behavior. The inclusion of price transparency is also theoretically justified by the broader literature on information transparency, which suggests that accessible and credible information can reduce consumer uncertainty and facilitate more informed purchasing decisions. This scale aligns with the growing emphasis on transparency as a determinant of consumer trust in sustainable and ethical consumption contexts (Schniederjans et al., 2016).

Finally, willingness to pay (WTP) a premium for local food was operationalized with a two-item scale developed by Shin et al. (2023), focusing on consumers’ readiness to pay more for locally produced options. Similar short scales have been effectively used in consumer behavior research to capture intention toward ethical and sustainable purchases (Lusk & Briggeman, 2009).

Table 1 summarizes the constructs, their dimensions, and measurement items. This combination of validated and widely adopted scales ensures strong construct validity and reliability, providing a robust framework for analyzing consumer confidence, proximity, and their influence on WTP for local food.

Table 1
Measurements of the Research Constructs.

Construct	Dimensions	Items	Authors
Proximity	Proximity of Relation	3	Mazieres and Gautier (2015)
	Proximity of Process	4	
	Proximity of Identity	4	
	Proximity of Access	4	
Past behavior	-	2	Shin et al. (2023)
Confidence	-	4	Lacoeuilhe and Belaid (2015)
Price Transparency	-	4	Minbashrazgah et al. (2017)
WTP more for local food	-	2	Shin et al. (2023)

3.2. Data Collection and Sampling

Data were collected in two phases to ensure robustness. A **convenience sampling** strategy was adopted to reach Saudi consumers, leveraging online distribution through email invitations, social media platforms, and professional networks. The use of an online survey was justified for two reasons: (1) it allowed efficient access to a geographically dispersed population across Saudi Arabia, thereby capturing diverse consumer profiles, and (2) it aligned with the increasing digitalization of both food marketing and consumer purchasing behaviors (Wright, 2005; Evans & Mathur, 2018).

In Phase 1 (Exploratory), 200 responses were collected to refine the measurement scales, identify problematic items, and conduct preliminary reliability and validity testing. In Phase 2 (Confirmatory), a larger sample of 367 valid responses was obtained to validate the final measurement model and test the proposed hypotheses (Table 3). This two-stage approach is consistent with recommendations for measurement development and model validation (Hair et al., 2019).

Table 3
Exploratory and Confirmatory Analysis of Measurements

Constructs		Purification Reliability							
		Cronbach Alpha/ Jöreskog's rho/ CR							
		Average Variance Extracted (AVE)	Eigen- value	Inertia %	Sphericity Bartlett's test		(α)	CR	(ρ)
KMO	P								
)Kaiser- Mayer- Olkin)									
Proximity	Proximity of relation	0.72	2.38	81	0.86	0.00	0.86	0.78	0.89
	Proximity of process	0.61	2.23	70	0.83	0.02			
	Proximity of identity	0.62	2.24	73	0.78	0.04			
	Proximity of access	0.68	2.31	81	0.81	0.01			
Consumer expertise		0.60	1.93	76	0.77	0.04	0.88	0.83	0.88
Confidence		0.58	1.86	73	0.73	0.03	0.91	0.81	0.84
Price transparency		0.71	2.35	83	0.78	0.04	0.88	0.86	0.89
Intention to purchase Local food		0.53	1.54	71	0.71	0.05	0.92	0.85	0.87

Data analysis was performed using SPSS 27.0 for descriptive statistics, reliability assessment, and exploratory factor analysis (EFA), followed by AMOS for confirmatory factor analysis (CFA) and structural equation modeling (SEM). This analytical strategy follows established guidelines for structural modeling and construct validation (Byrne, 2016; Rourke & Hatcher, 2013).

The demographic characteristics of respondents are summarized in Table 2. While online surveys provide efficiency and reach, they can also introduce limitations such as self-selection bias and demographic imbalance (Bethlehem, 2010). These limitations are acknowledged and further addressed in the discussion to reflect on their implications for generalizability.

Table 2
Sample Profile

Demographic Characteristics	Number = 367	Percentage
Age		
Under 20	14	3.81%
20–29	29	7.90%
30–39	97	26.43%
40–49	121	32.97%
50–59	88	23.98%
60 or over	18	4.90%
Gender		
Male	188	51.23%
Female	179	48.77%
Highest Level of Education		
Secondary School	46	12.53%
Certificate	68	18.53%
Bachelor	134	36.51%
Master	91	24.80%
Ph.D.	28	7.63%

4. Results

4.1. Exploratory Factor Analysis (EFA)

The analysis began with an Exploratory Factor Analysis (EFA) using SPSS 27.0 to explore the latent structure of the measurement scales and assess their psychometric robustness. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy exceeded the recommended threshold of 0.70, and Bartlett's Test of Sphericity was significant at $p < 0.001$, confirming that the data were suitable for factor analysis (Kaiser, 1974; Hair et al., 2019). Eigenvalues greater than 1 and factor loadings above 0.60 confirmed the appropriateness of item retention, with Average Variance Extracted (AVE) values exceeding 0.50 across all constructs. These results suggest that the indicators adequately represented their intended latent variables.

Reliability was confirmed through Cronbach's alpha and Jöreskog's rho, with all constructs surpassing the 0.70 benchmark (Nunnally & Bernstein, 1994; Fornell & Larcker, 1981). Principal Component Analysis (PCA) further validated the unidimensionality of constructs, with inertia values remaining within acceptable ranges. Together, these results establish strong evidence of construct reliability and validity, offering a solid basis for confirmatory factor analysis.

4.2. Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) was conducted using AMOS to validate the measurement model and assess both convergent and discriminant validity. Convergent validity was supported, as all standardized factor loadings exceeded 0.70, AVE values surpassed 0.50, and Composite Reliability (CR) values were above the 0.70 threshold (Fornell & Larcker, 1981; Hair et al., 2019). This indicates that items effectively converged on their respective constructs.

Discriminant validity was evaluated by comparing the square roots of AVE values with inter-construct correlations. In all cases, the square roots of AVE were higher than the corresponding correlations, supporting the distinctiveness of each construct (Fornell & Larcker, 1981; Henseler et al., 2015). These findings confirm that the measurement model was statistically sound, providing a robust framework for hypothesis testing (Table 4).

Table 4
Analysis of discriminate validity

Constructs		Prox_R	Prox_P	Prox_I	Prox_A	Cons_Ex	Conf	Price_Tr	WTPM
Convergent validity Rhô (pvc)		0.71	0.65	0.66	0.69	0.64	0.59	0.7	0.52
Square root pvc		0.84	0.81	0.81	0.83	0.80	0.77	0.84	0.72
Proximity of relation:	Prox_R	1							
Proximity of process:	Prox_P	0.48	1						
Proximity of identity:	Prox_I	0.57	0.56	1					
Proximity of access:	Prox_A	0.53	0.68	0.58	1				
Consumer expertise:	Cons_Ex	0.62	0.62	0.49	0.63	1			
Confidence:	Conf	0.68	0.53	0.61	0.67	0.49	1		
Price transparency:	Price_Tr	0.70	0.61	0.63	0.64	0.58	0.58	1	
Intention to purchase Local food:	WTPM	0.65	0.59	0.61	0.68	0.62	0.65	0.71	1

4.3. Structural Model Fit

To assess the adequacy of the structural model, multiple fit indices were examined in line with the recommendations of Roussel et al. (2002) and Hu & Bentler (1999). The results showed χ^2/df values below the recommended threshold of 3, Root Mean Square Error of Approximation (RMSEA) values under 0.08, and Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) values above 0.90. Collectively, these results indicate that the proposed model demonstrates a satisfactory balance between fit and parsimony, confirming its overall validity and suitability for hypothesis testing (Table 5).

Table 5
Model fit

Adjustment index
GFI = 0.93 $\geq$ 0.9
AGFI = 0.92 $\geq$ 0.9
N = 367 > 200
RMSEA = 0.02 < 0.03
Incremental index
TLI = 1,0 $\geq$ 0.9
CFI = 1.0 $\geq$ 0.9
RFI = 0.96 $\geq$ 0.9
Parsimony index
AIC = 168.34
CAIC = 279.73
ECVI = 0.87

4.4. Hypotheses Testing

Hypotheses were tested using maximum likelihood estimation and Student's *t*-tests at a 5% significance level. The results, presented in Table 6, reveal that relational proximity (H1.1) and access proximity (H4.1) significantly influenced consumer confidence, whereas identity proximity (H3.1) showed no significant effect. In addition, relational (H1.2), process (H2.2), and access proximities exerted significant positive effects on willingness to pay (WTP), while identity proximity remained insignificant.

Table 6
Examination of the direct effect

Hypothesis	C.R.	P	Hypothesis check
H1.1. Confidence $\leftarrow$ Proximity of relation	2.62	0.011	Supported
H2.1. Confidence $\leftarrow$ Proximity of process	1.98	0.916	Rejected
H3.1. Confidence $\leftarrow$ Proximity of identity	0.66	0.671	Rejected
H4.1. Confidence $\leftarrow$ Proximity of access	2.82	0.026	Supported
H1.2. WTP more for local food $\leftarrow$ Proximity of relation	2.20	0.012	Supported
H2.2. WTP more for local food $\leftarrow$ Proximity of process	2.57	0.018	Supported
H3.2. WTP more for local food $\leftarrow$ Proximity of identity	0.82	0.520	Rejected
H4.2. WTP more for local food $\leftarrow$ Proximity of access	2.93	0.024	Supported
H5. WTP more for local food $\leftarrow$ Confidence	3.24	0.003	Supported

Furthermore, consumer confidence (H5) demonstrated a strong and positive effect on WTP, underscoring its central role in shaping purchasing behavior. These findings align with earlier studies emphasizing the importance of relational closeness and trust in fostering consumer support for local food products (Schnettler et al., 2013; Giampietri et al., 2018). Overall, relational, process, and access proximities emerged as critical determinants of consumer engagement with local food, while identity proximity proved less influential.

4.5. Mediation Analysis

The mediating role of consumer confidence was tested using the causal steps approach proposed by Baron and Kenny (1986) and validated through significance testing of indirect effects. The results (Table 7) revealed full mediation in the relationship between process proximity and WTP (H6.2), partial mediation between identity proximity and WTP (H6.3), and no mediation for relational proximity (H6.1).

Table 7
Testing the mediating role of consumer confidence

Hypothesis H6:	H6.1.		H6.2.		H6.3.		H6.4.	
Coefficient	R ²	P	R ²	P	R ²	P	R ²	P
Condition								
Condition 1	0.86	0.09	0.21	0.01	0.05	0.00	0.89	0.91
Condition 2	0.68	0.22	0.34	0.03	0.08	0.02	0.68	0.63
Conditions 3 + 4	0.58	0.42	0.45	0.01	0.05	0.01	0.58	0.13
Mediation	No mediation		Total mediation		Partial mediation		No mediation	
Hypothesis check	Rejected		Supported		Supported		Rejected	

These results suggest that consumer confidence serves as a key mechanism translating certain forms of perceived proximity—particularly process-related—into higher willingness to pay. This finding is consistent with research highlighting the mediating role of trust in sustainable food systems (Teng & Wang, 2015; Loureiro & Hine, 2002).

4.6. Moderation Analysis

Moderating effects were further examined for past consumer behavior and price transparency (Table 8). Results indicated that past behavior significantly strengthened the effects of relational and process proximities on consumer confidence (H7.1 and H7.2), confirming the reinforcing role of experiential familiarity in building trust (Vermeir & Verbeke, 2008). Conversely, identity and access proximities showed no significant moderation by past behavior (H7.3 and H7.4), suggesting that these dimensions may require further contextual exploration.

Table 8
Testing the moderating role of price transparency on consumers' WTP more.

Moderating test process			Regression significantly		Hypothesis check
Past behaviour moderating effect (Proximity-Confidence)			F	P	
Proximity	Proximity of relation (Prox1)	Prox1 (X)/Conf (Y)	13.23	0.000	H7.1. Supported
		Con_exp(Z) /Conf (Y)	18.03	0.000	
		Moderator_ZCon_exp*Z Prox/Conf (Y)	9.13	0.012	
	Proximity of process (Prox2)	Prox2 (X)/Conf (Y)	3.38	0.653	H7.2. Supported
		Con_exp(Z) /Conf (Y)	9.26	0.023	
		Moderator_ZCon_exp*Z Prox/Conf (Y)	8.62	0.042	
	Proximity of identity (Prox3)	Prox3 (X)/Conf (Y)	11.31	0.623	H7.3. Rejected
		Con_exp(Z) /Conf (Y)	8.12	0.236	
		Moderator_ZCon_exp*Z Prox/Conf (Y)	2.32	0.716	
	Proximity of access (Prox4)	Prox4 (X)/Conf (Y)	1.85	0.003	H7.4. Rejected
		Con_exp(Z) /Conf (Y)	4.16	0.655	
		Moderator_ZCon_exp*Z Prox/Conf (Y)	2.38	0.715	
Price transparency moderating effect (Confidence-WTP more)					
Confidence (Conf)	Conf (X)/Eng_cons (Y)	16.23	0.000	H8.	
	Price_sens (Z) /Eng_cons (Y)	21.35	0.003	Supported	
	Moderator_ZConf *Z Price_sens/Eng_cons (Y)	9.36	0.028		

In addition, price transparency (H8) significantly enhanced the relationship between consumer confidence and WTP. This finding resonates with prior studies that underscore the importance of transparent and fair pricing in building trust and encouraging premium payment for local and sustainable foods (Feldmann & Hamm, 2015).

4.7. Summary of Findings

Taken together, these results highlight that relational, process, and access proximities are key drivers of consumer confidence and willingness to pay for local food products, while identity proximity appears less relevant in this context. Consumer confidence partially mediates these relationships and is further strengthened by past consumer experience. Importantly, price transparency significantly enhances the effect of confidence on

WTP, suggesting that policies and marketing strategies aimed at fostering openness and clarity in pricing can strengthen consumer trust and boost support for local food markets.

These findings contribute to the growing body of research on consumer behavior in local food systems by demonstrating how proximity, confidence, and transparency interact to shape purchasing intentions. They also provide practical implications for local producers, policymakers, and marketers seeking to encourage consumer engagement with local foods in Saudi Arabia and comparable contexts.

5. Discussion and Conclusions

The findings of this study underscore the pivotal role of consumer confidence in shaping purchasing behaviors related to local food, particularly through the dimensions of relational and process proximities. Consumers who perceive a strong connection with local producers through interpersonal interactions, process familiarity, and access to production methods are more inclined to pay a premium for locally sourced products. These results align with prior research emphasizing the importance of trust and community attachment in promoting ethical consumption (Feldmann & Hamm, 2015; McFadden, 2016). Notably, the non-significant effects of identity and access proximities suggest that proximity does not exert a uniform influence across all dimensions of consumers' willingness to pay (WTP) for local products. This finding is consistent with research indicating that local food consumption is shaped by multiple, context-dependent values and motivations rather than by a single determinant (Zhang et al., 2020). In the Saudi context, the results suggest that relational and process-based proximities may be more influential in fostering trust and engagement, whereas symbolic identification with local producers and perceived accessibility may play a comparatively limited role in determining consumers' WTP for local products.

A key contribution of this research lies in demonstrating the moderating role of price transparency in the relationship between consumer confidence and WTP. The results show that when consumers perceive pricing as fair, transparent, and easily accessible, their confidence in local food products strengthens, ultimately enhancing their readiness to pay a premium. This finding is consistent with recent studies emphasizing transparent pricing as a trust-building mechanism in sustainable and ethical food markets (Sweeney et al., 2022; Molnár et al., 2023). By elucidating the interplay between confidence and perceived pricing clarity, this study extends the literature on local food systems, highlighting an actionable mechanism through which producers and policymakers can enhance ethical consumption behaviors. Moreover, these insights are particularly relevant to Saudi Arabia's Vision 2030 initiatives, which aim to bolster domestic agricultural products and strengthen local food systems (Alrobaish, et al., 2021).

The practical implications of these findings are substantial. For policymakers, strategies that enhance consumer confidence through community engagement, transparency, and trust-building can significantly increase participation in local food markets. Public campaigns that emphasize the nutritional, economic, and environmental benefits of local food systems may further stimulate consumer interest and ethical consumption (Riefler, 2020). For local producers, cultivating strong consumer relationships through effective communication, storytelling, and trust-building practices is essential. This aligns with findings from Dubé et al. (2022), who underscore that consumer trust is a direct predictor of engagement with local food systems. In practice, this could include initiatives such as farm visits, interactive online content, and consistent messaging about production practices and local impact.

This study also opens avenues for future research. Investigating additional psychological and behavioral factors such as perceived value, risk perception, social influence, and ethical beliefs could provide a more comprehensive understanding of local food purchasing behaviors. Longitudinal studies would be particularly valuable in tracking the evolution of consumer attitudes over time, especially in response to changing market dynamics, cultural perceptions, or economic conditions (Lal et al., 2023). Expanding the research to different cultural contexts, particularly in developing nations with distinctive challenges in local food systems, could yield comparative insights and enhance generalizability.

Moreover, the role of digital platforms and social media in shaping consumer confidence and WTP warrants further attention. With the increasing digitization of food marketing, online engagement can foster trust, provide transparent information, and facilitate stronger connections between producers and consumers (Verhoef et al., 2021). Recent studies highlight that digital storytelling and interactive content can significantly enhance consumer engagement and support for local food initiatives (Bresciani & Eppler, 2022).

In conclusion, this study advances our understanding of the determinants of WTP for local food by highlighting the critical roles of consumer confidence, relational and process proximities, price transparency, and past consumer behavior. By addressing existing gaps in the literature and providing actionable insights for both policymakers and local producers, the research contributes to both theory and practice. Ultimately, fostering confidence, trust, and transparency can strengthen sustainable and resilient local food systems, supporting the needs of both consumers and producers while promoting ethical consumption patterns in the Saudi context and beyond.

Declarations

Competing interests: The authors declare that they have no competing interests.

Informed consent: 'This article does not contain any studies with human participants performed by any of the authors'.

Consent to publish: This paper has undergone a process of approval to be published.

Consent to participate: Written informed consent was obtained electronically from all participants prior to the start of the questionnaire. Participants were provided with information about the purpose of the study, the voluntary nature of participation, the anonymity and confidentiality of responses, and their right to withdraw at any time without penalty. No personally identifiable data were collected.

Clinical trial number: not applicable.

Ethical Approval and accordance

This study was approved by the Marketing Department Research Committee at Northern Border University, Saudi Arabia. The research was conducted in accordance with the ethical guidelines and requirements of the committee and the applicable institutional regulations for research involving human participants. All participants provided informed consent before participating in the study. Participation was voluntary, and participants were informed that their responses would be treated confidentially and used solely for research purposes.

Data Availability

The datasets generated and/or analyzed during the current study are not publicly available due to privacy and confidentiality considerations concerning the study participants but are available from the corresponding author on reasonable request.

Consent to Publish

Not applicable.

Conflict of interest:

The authors declare no competing interests.

Author Contribution

M.T. and S.M. contributed equally to conceptualization, methodology, data collection, analysis, writing (original draft), review and editing, visualization, supervision, project administration, funding acquisition, and resources.

Acknowledgement

The authors extend their gratitude to the Deanship of Scientific Research at Northern Border University, Arar, KSA for funding this research project through the project number: NBU-FFR-2026-2217-3.

References

1. Aaker DA. Managing brand equity: Capitalizing on the value of a brand name. Free; 1991.
2. Ahmed ZU, Johnson JP, Ling CP, Fang TW, Hui AK. Country-of-origin and brand effects on consumers' evaluations of cruise lines. *Int Mark Rev.* 2020;37(1):57–75. <https://doi.org/10.1108/IMR-01-2018-0019>.
3. Ajzen I. From intentions to actions: A theory of planned behavior. *Springer Series in Social Psychology*; 1985. pp. 11–39.
4. AlHussaini A, Alqahtani S, Alotaibi R. Local food production and sustainable consumption in Saudi Arabia: Emerging patterns under Vision 2030. *Sustainability.* 2023;15(7):5542.
5. Alrobaish WS, Vlerick P, Luning PA, Jacxsens L. Food safety governance in Saudi Arabia: Challenges in control of imported food. *J Food Sci.* 2021;86(1):16–30. <https://doi.org/10.1111/1750-3841.15552>.
6. Al-Otaibi S, Al-Rashid A. Souks and consumer trust: The evolution of relational proximity in Saudi marketplaces. *Arab J Mark Stud.* 2022;14(1):22–39.
7. Alshammari S. E-commerce expansion and food accessibility in Saudi Arabia under Vision 2030. *J Retail Consumer Serv.* 2020;54:102041. <https://doi.org/10.1016/j.jretconser.2019.102041>.
8. Al-Tayyar F. Food and identity in Saudi Arabia: A cultural perspective on local food systems. *Cult Stud Rev.* 2021;27(2):104–18. <https://doi.org/10.5130/csr.v27i2.7781>.
9. Amine A. The meaning of consumer confidence. *Eur Adv Consumer Res.* 1993;1:417–20.

10. Aschemann-Witzel J, Giménez A, Ares G. Consumer in-store choice of local food: The importance of marketing communications and proximity. *Food Qual Prefer.* 2021;88:104111.
11. Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research. *J Personal Soc Psychol.* 1986;51(6):1173–82.
12. Bergadaà M, Del Bucchia C. Proximité perçue et circuits courts alimentaires. *Revue Française du Mark.* 2009;223(3/5):19–36.
13. Bessière J. Heritagisation', a challenge for tourism promotion and regional development: An example of food heritage. *J Herit Tourism.* 2013;8(4):275–91.
14. Bethlehem J. Selection bias in web surveys. *Int Stat Rev.* 2010;78(2):161–88.
15. Brennan C, Parker L, Talukdar D. Consumer trust, confidence, and loyalty in local food systems: A multi-country study. *Food Qual Prefer.* 2022;97:104520. <https://doi.org/10.1016/j.foodqual.2021.104520>.
16. Bresciani S, Eppler M. Digital storytelling in local food marketing: Enhancing engagement and trust. *J Interact Mark.* 2022;56:45–60.
17. Burgess R, Harris L, Reynolds C. From proximity to confidence: The role of trust in consumer willingness to pay for local food. *Appetite.* 2022;168:105751. <https://doi.org/10.1016/j.appet.2021.105751>.
18. Byrne BM. *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming.* 3rd ed. Routledge; 2016.
19. De Magistris T, Gracia A. Consumers' willingness-to-pay for sustainable food products: The case of organic olive oil. *J Food Prod Mark.* 2016;22(3):303–21. <https://doi.org/10.1080/10454446.2014.949990>.
20. Delgado-Ballester E. Applicability of a brand trust scale across product categories: A multigroup invariance analysis. *Eur J Mark.* 2004;38(5/6):573–92.
21. Dubé L, Chebat J-C, Morin S. Consumer trust and engagement in local food systems. *Food Qual Prefer.* 2022;96:104–12.
22. Dubuisson-Quellier S. *Fair trade: A new fashion in consumption.* Routledge; 2009.
23. Dufeu I, Ferrandi JM. Impact of perceived proximity on consumer behavior: The case of local food. *J Food Prod Mark.* 2013;19(3):149–65.
24. El-Feki A, Abu-Zayed Y. Building consumer trust in local food brands: Evidence from the Middle East. *J Int Food Agribusiness Mark.* 2023;35(3):261–80. <https://doi.org/10.1080/08974438.2022.2061742>.
25. Evans JR, Mathur A. The value of online surveys. *Internet Res.* 2018;28(4):854–87.
26. Everett S, Aitchison C. The role of food tourism in sustaining regional identity: A case study of Cornwall, South West England. *J Sustainable Tourism.* 2008;16(2):150–67.
27. Feldmann C, Hamm U. Consumers' perceptions and preferences for local food: A review. *Food Qual Prefer.* 2015;40:152–64. <https://doi.org/10.1016/j.foodqual.2014.09.014>.
28. Fonte M. Food systems and the social construction of local food. *Sociologia Ruralis.* 2010;50(4):325–41.
29. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *J Mark Res.* 1981;18(1):39–50.
30. Fournier S. Consumers and their brands: Developing relationship theory in consumer research. *J Consum Res.* 1998;24(4):343–73. <https://doi.org/10.1086/209515>.
31. Giampietri E, Verneau F, Del Giudice T, Carfora V, Finco A. A theory of planned behaviour perspective for investigating the role of trust in consumer purchasing decision related to short food supply chains. *Food*

Qual Prefer. 2018;64:160–6.

32. Ginieis M, de la Torre C, Camilleri J. Consumer proximity and willingness to pay for local food: The mediating role of trust. *Br Food J.* 2023;125(4):1198–218. <https://doi.org/10.1108/BFJ-03-2022-0231>.
33. Hair JF, Black WC, Babin BJ, Anderson RE. *Multivariate data analysis.* 8th ed. Cengage Learning; 2019.
34. Henseler J, Ringle CM, Sarstedt M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J Acad Mark Sci.* 2015;43(1):115–35.
35. Hérault-Fournier C, Pouzenc M. The role of trust in consumer perceptions of local food. *Int J Consumer Stud.* 2014;38(4):337–45. <https://doi.org/10.1111/ijcs.12092>.
36. Hérault-Fournier C, Merle A, Prigent-Simonin AH. The influence of perceived proximity on consumers' willingness to buy. *Recherche et Appl en Mark.* 2010;25(3):41–58.
37. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis. *Struct Equ Model.* 1999;6(1):1–55.
38. Innes R, Hobbs JE. Does transparency in food supply chains boost consumer confidence? *J Agric Econ.* 2011;62(2):345–58. <https://doi.org/10.1111/j.1477-9552.2011.00290.x>.
39. Jin B, Shin DC. The effects of transparency and consumer expertise on purchase intention. *Int J Retail Distribution Manage.* 2020;48(2):123–41. <https://doi.org/10.1108/IJRDM-02-2019-0059>.
40. Johnson K, Browne M. Past purchasing behavior and consumer trust in local food. *J Consumer Behav.* 2023;22(3):409–23. <https://doi.org/10.1002/cb.2104>.
41. Kaiser HF. An index of factorial simplicity. *Psychometrika.* 1974;39(1):31–6.
42. Kumar A, Prakash G, Kumar G. Does accessibility enhance consumer trust in local food? *J Retailing Consumer Serv.* 2020;54:102018. <https://doi.org/10.1016/j.jretconser.2019.102018>.
43. Lacoëuilhe J, Belaid S. Consumer confidence: Development and validation of a measurement scale. *Recherche et Appl en Mark.* 2015;30(3):45–68.
44. Lal R, Sharma S, Verma R. Understanding consumer behavior in local food markets: A longitudinal perspective. *J Retailing Consumer Serv.* 2023;70:103–20.
45. Lenglet F, Muller P. From relational proximity to consumer trust: The role of interaction in local food markets. *J Mark Manage.* 2016;32(15–16):1510–32. <https://doi.org/10.1080/0267257X.2016.1151418>.
46. Liao C, Liu Y, Chen J. Proximity and consumer trust in local food systems: Evidence from Asia. *Food Policy.* 2023;117:102390.
47. Liu Y, Zheng Y, Ma Y. Ethical consumption and willingness to pay for local foods: The mediating role of trust. *J Clean Prod.* 2023;381:135168. <https://doi.org/10.1016/j.jclepro.2022.135168>.
48. Loureiro ML, Hine S. Discovering niche markets: A comparison of consumer willingness to pay for local (Colorado grown), organic, and GMO-free products. *J Agric Appl Econ.* 2002;34(3):477–87.
49. Lusk JL, Briggeman BC. Food values. *Am J Agric Econ.* 2009;91(1):184–96.
50. Manning L, Baines RN, Chadd SA. Food safety and process transparency: Consumer expectations. *Br Food J.* 2016;118(1):3–18. <https://doi.org/10.1108/BFJ-08-2014-0283>.
51. Mazières C, Gautier A. Perceived proximity and consumer preferences: Evidence from French local food systems. *Int J Consumer Stud.* 2015;39(4):307–15.
52. McFadden J. Ethical consumption and the role of trust in local food systems. *J Consumer Ethics.* 2016;12(1):33–50.

53. Minbashrazgah MM, Maleki F, Torabi M. Green chicken purchase behavior: The moderating role of price transparency. *Manage Environ Quality: Int J.* 2017;28(6):902–16. <https://doi.org/10.1108/MEQ-12-2016-0093>.
54. Molnár A, Kovács G, Varga E. Price transparency and consumer confidence in sustainable food markets. *Sustainability.* 2023;15(4):2120–38.
55. Nunnally JC, Bernstein IH. *Psychometric theory.* 3rd ed. McGraw-Hill; 1994.
56. Riefler P. Local versus global food consumption: The role of brand authenticity. *J Consumer Mark.* 2020;37(3):317–27. <https://doi.org/10.1108/JCM-02-2019-3086>.
57. Roussel P, Durrieu F, Campoy E, Akremi E, A. *Méthodes d'équations structurelles: Recherche et applications en gestion.* Economica; 2002.
58. Schmidt C, Gorton M, White J. Past experience and consumer willingness to pay for food quality attributes. *Appetite.* 2022;171:105941. <https://doi.org/10.1016/j.appet.2022.105941>.
59. Schnettler B, Crisóstomo G, Sepúlveda J, Mora M, Lobos G, Miranda H, Denegri M. Food neophobia, satisfaction with food-related life and family eating habits in university students. *Cadernos de saúde pública.* 2013;29(4):771–81.
60. Schniederjans D, Cao ES, Schniederjans M. Enhancing trust in E-commerce: The role of price transparency. *J Bus Res.* 2016;69(9):3715–22.
61. Shin S, Lee H, Hwang J. Consumer willingness to pay for local food: A cross-cultural analysis. *Food Qual Prefer.* 2023;105:104695.
62. Sims R. Food, place and authenticity: Local food and the sustainable tourism experience. *J Sustainable Tourism.* 2009;17(3):321–36.
63. Sirgy MJ. Self-concept in consumer behavior: A critical review. *J Consum Res.* 1982;9(3):287–300. <https://doi.org/10.1086/208924>.
64. Sweeney J, Shaw D, Clarke I. Trust and pricing transparency in ethical food consumption. *J Consum Policy.* 2022;45(3):567–89.
65. Tajfel H, Turner JC. An integrative theory of intergroup conflict. In: Austin WG, Worchel S, editors. *The social psychology of intergroup relations.* Brooks/Cole; 1979. pp. 33–47.
66. Teng CC, Wang YM. Decisional factors driving organic food consumption. *Br Food J.* 2015;117(3):1066–81.
67. Thilmany D, Watson P. *The economics of local food systems: A toolkit to guide community discussions, assessments, and choices.* USDA Report; 2020.
68. Toukabri M. Consumer confidence and willingness to pay for local food in emerging markets. *Int J Emerg Market Stud.* 2021;15(2):211–27.
69. Toukabri M. Relational proximity and consumer trust: Evidence from Middle Eastern food markets. *J Int Consumer Mark.* 2023;35(1):55–72. <https://doi.org/10.1080/08961530.2022.2076915>.
70. Toukabri M, Ghali Z. The impact of e-commerce on local food consumption: Evidence from Saudi Arabia. *J Retail Mark Rev.* 2020;16(2):88–104.
71. Toukabri M et al. (2019, 2020, 2021). [series of works on proximity and consumer confidence in local foods].
72. Verhoef PC, Broekhuizen T, Bart Y, Bhattacharya A, Qi Dong J, Fabian N, Haenlein M. Digital transformation in retail: Driving trust and engagement. *J Retail.* 2021;97(1):1–24.

73. Vermeir I, Verbeke W. Sustainable food consumption among young adults in Belgium. Sustainability. 2008;1(4):512–30.

74. Wang J, Xu X, Li H. The role of price transparency in consumer trust and willingness to pay for local food. J Bus Res. 2023;158:113664. <https://doi.org/10.1016/j.jbusres.2023.113664>.

75. Wright KB. Researching Internet-based populations: Advantages and disadvantages of online survey research. J Computer-Mediated Communication. 2005;10(3):JCMC1034.

76. Zepeda L, Deal D. Organic and local food consumer behavior: Alphabet theory. Int J Consumer Stud. 2009;33(6):697–705.

77. Zhang T, Grunert KG, Zhou Y. A values–beliefs–attitude model of local food consumption: An empirical study in China and Denmark. Food Qual Prefer. 2020;83:103916. <https://doi.org/10.1016/j.foodqual.2020.103916>.

Figures

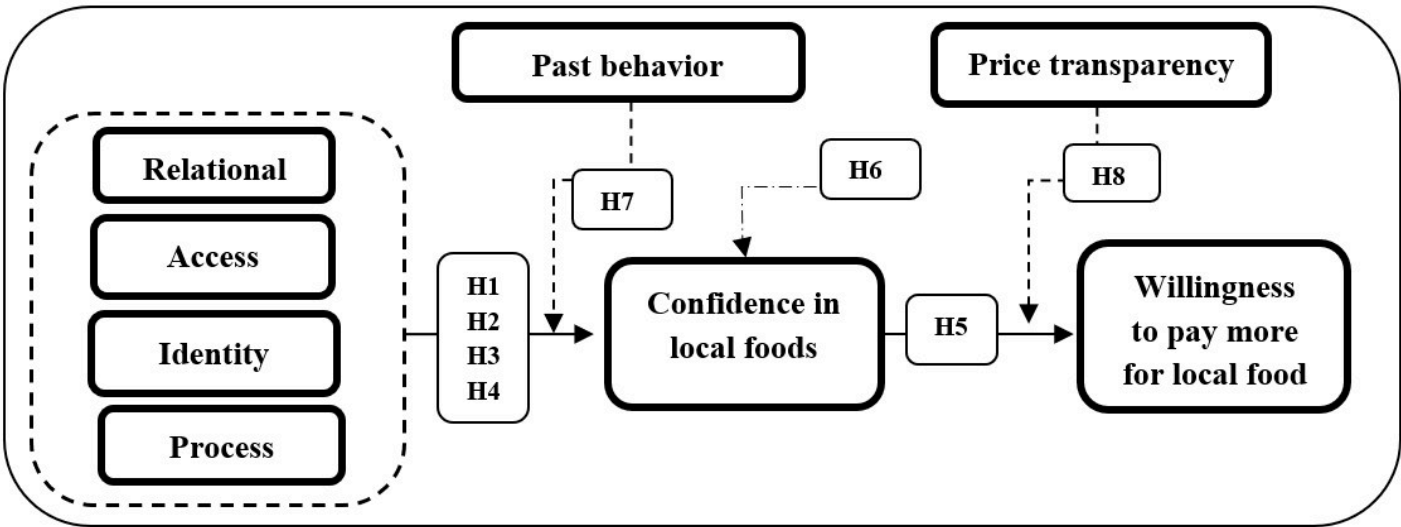


Figure 1

Research model