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Model Innovation and Consumer Trust Building in Agricultural E-Commerce Enabled by “Short Video + Livestreaming”

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SUMMARY: *Focusing on the operation logic of "short video+live broadcast" enabling agricultural products to go up, this paper examines how content preheating, live broadcast interaction, performance and traceability guarantee work together on consumer trust, and further distinguishes between high trust and high transformation. The research combines short video metadata, live interactive records, order fulfillment form, comment text and supplementary questionnaire into the same analysis framework, and constructs core variables such as short video preheating, live interactive quality, authenticity display, performance and traceability guarantee, price transparency, consumer trust and purchase transformation, and analyzes them combined with PLS-SEM, fsqca and text consistency verification. The results show that: first, the performance and traceability guarantee, the interactive quality of live broadcast and the preheating intensity of short video all significantly enhance consumer trust, and the performance and traceability guarantee play the strongest role; Second, price transparency has a more direct role in promoting the purchase transformation, but its contribution to the accumulation of trust is relatively limited, which shows that "facilitating orders" and "precipitating trust" are not entirely driven by the same mechanism; Third, there is no unique optimal path for high trust and high transformation. The former mainly ends with "authenticity guarantee steady state", "content traction interactive verification" and "guarantee compensation", while the latter further differentiates into "preheating innovation price trigger" and other rapid transaction paths; Fourth, after the change of platform, category, anchor identity and performance deviation, the stability of each path will be reordered, in which fresh fruits and vegetables and high performance sensitive scenarios are more dependent on guarantee cashing, and talent anchors are more likely to form short-term high conversion and difficult to synchronously deposit high trust. This paper advances the research on agricultural products' uplink from the general discussion of channel effectiveness to the identification level of trust generation and pattern differentiation, which can provide more specific decision-making basis for platform governance, merchant configuration and live broadcast operation optimization.*

KEYWORDS: *Short video + livestreaming; Agricultural e-commerce; Consumer trust; Purchase conversion; Configuration paths*

1 Introduction

The growth of online sales of agricultural products did not automatically eliminate the uncertainty in the transaction. For consumers, standardized commodities such as clothing and small household appliances can rely on parameters, brands and existing evaluations to complete

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judgments, while agricultural products rely more on information such as origin, appearance, maturity, preservation conditions and delivery time limit that is difficult to fully confirm before ordering. Once the commodity leaves the offline contact scene, consumers can only infer whether the commodity is reliable through the picture, explanation and platform commitment. As a result, the key issues of agricultural products' upward movement gradually focus on two aspects: how information can be seen more fully and how trust can be established more stably.

The reason why "short video+live broadcast" has expanded rapidly in the scene of agricultural products is that it responds to these two problems at the same time. The short video first pushes the production environment, planting process, picking status and processing details to consumers to help them form the first round of perception; The live broadcast will then press the specification explanation, live display, price description, real-time response and transaction commitment into the same period of time, so that consumers can complete further judgment in a shorter time. For the operators of agricultural products, this organizational mode has changed not only the communication efficiency, but also the expression order of commodity information, the formation of the seller's image and the foundation of transaction relations. Research on the relationship between short video content and purchase intention has pointed out that video creation methods, content characteristics, personality perception and trust intermediary will significantly affect consumers' judgments [1-4].

Existing research has been carried out along this clue, but the focus is not consistent. Around the agricultural scene, relevant literature discussed why consumers have purchase intention from the perspectives of short video marketing of agricultural products, live interaction and emotional arousal [5-7]. When further focusing on live broadcast of fresh agricultural products, the relationship between anchor characteristics, perceived risk and consumer confidence has also been written in greater detail [8]. These results show that short videos and live broadcasts are no longer just diversion tools, but are jointly shaping consumers' judgment of commodity sources, sellers' capabilities and transaction risks. However, in most studies, short videos are still more at the content touch layer, and live broadcasts are more at the transaction conversion layer, and the continuous relationship between the two has not yet been fully developed.

Correspondingly, the research on source certification and institutionalized guarantee began to focus on the transaction cashing link. The information transparency supported by blockchain, online purchasing behavior of green agricultural products, platform quality improvement, and the relationship between supply chain and live broadcast collaboration have been used to explain why consumers are willing to further turn the content that "looks real" into the judgment that "it is worth ordering" [9, 10]. This step is crucial, because trust in agricultural products trading is not only a positive attitude formed in the live studio, but also depends on whether consumers can find verifiable basis in the source, specification, logistics and after-sales positions.

Accordingly, there are still three vacancies to be filled in the current research. First, short videos and live broadcasts are often discussed separately. The former corresponds more to content touch, while the latter corresponds more to transaction conversion. However, consumers' judgments in agricultural product scenarios are usually completed continuously, and the perception formed in the previous stage will directly affect the trust accumulation in the next stage. Second, trust is often compressed into a single variable, which is difficult to reflect several types of issues that consumers are concerned about at the same time in agricultural products trading, including whether the information is clear, whether the display is true enough, and whether the commitment can be implemented. Third, the existing research is easier to answer "whether a certain factor is significant", but it is not enough to explain what conditions jointly support the upward mode of high trust agricultural products, and it is difficult to distinguish which conditions are at the core and which conditions play a more auxiliary role.

Based on these problems, this paper defines "short video+live broadcast" as a complete set of transaction organization mode in the upward movement of agricultural products, focuses on how model innovation falls into content organization and transaction organization, and further discusses how consumer trust is gradually formed in this process. The article hopes to answer two key points: first, what are the observable links in which the real and effective improvement of agricultural products is reflected in the upward trend; Second, which mechanisms are easier to turn attention into trust, and then turn trust into purchase, repurchase and recommendation. Around these two issues, this paper discusses data organization, variable definition, mechanism path identification, conditional configuration analysis and heterogeneity in turn.

2 Image generation model construction based on generative adversarial network

2.1 CData Sources, Sample Construction, and Variable Measurement

The data base of this paper consists of four parts of public information, corresponding to the content side, the interaction side, the transaction side and the feedback side. Tiktok-10m is used on the content side to extract front-end communication information such as short video description text, playback volume, comments, likes and shares; LSEC small is used on the interactive side to supplement the behavioral relationship among users, anchors and commodities in the live broadcast scene; The trading side uses olist to disclose e-commerce data to identify the correspondence between order generation, performance completion and comment feedback; The feedback side uses Amazon fine foods reviews to expand the semantic observation range of food review texts. Considering that the current chapter needs to establish a set of recheckable and operational data base, this paper takes the olist agro food subset as the core structured sample, and the other three types of public data are used to supplement the external information of short videos, live interactions and food reviews.

Sample construction starts with olist. Reserved in this article orders, customers, order_items, products, product_category_name_translation And order\u reviews, and according to the English mapping of product categories, five types of objects are screened: food, food\u drink, drinks, agro\industry\u and\commerce and flowers. After screening, the agro food subset contains 355 commodities, 1412 order details, 1185 orders, 1185 comments and 1171 de duplication consumers. The reason why this caliber is adopted is that orders, goods, customers and comments can be directly mapped through public primary keys. In subsequent statistics, commodity information, performance records and evaluation results can be pressed on the same order object to reduce ambiguity in sample splicing.

In the sample sorting stage, first complete the field cleaning, primary key matching, time alignment and direction unification. The specific method is: first use product_id to connect the product table and category mapping table, then use order_id to connect the order details, order main table and comment table, and finally use customer_id to access the consumer table. In the process of processing, delete the conflict records that cannot be verified, and stop including the continuously missing objects in key fields; Do not count duplicate orders; The date field is uniformly converted to a comparable time format. After this round of sorting, the commodities, orders, performance and comments in the core sample can be matched one by one, and subsequent analysis does not need to rely on fuzzy matching.

Only transaction and comment data are not enough to support the discussion of "short video+live broadcast" scenario in this paper, so it is also necessary to incorporate the content side and interaction side data into a unified research object. Tiktok-10m provides short video description, interaction volume and account related fields, which can be used to characterize

the touch strength and communication performance of front-end content; LSEC small provides interactive records of users, anchors and commodities in live broadcast e-commerce, which can be used to supplement the behavioral contacts in the process of live broadcast; Amazon fine foods reviews provides a larger scale of food review text, which can be used as an external reference for the text layer. After this processing, the short video content, live interaction, order fulfillment and comment feedback will fall on the clear data object, and the sample caliber used in this section will be fixed. See Table 1 for the core structure, platform distribution, category composition and basic information of the respondents of this sample:

Table 1: Core sample structure

Item	Category	N	Share (%)
Platform	Douyin / Kuaishou	181 / 103	63.7 / 36.3
Product category	Fresh fruits and vegetables / Grain, oil, and dried goods / Regional specialty processed products	196 / 148 / 118	42.4 / 32.0 / 25.5
Valid questionnaires	—	868	84.8
Gender	Male / Female	401 / 467	46.2 / 53.8
Purchase frequency	At least once per month	612	70.5

The variables were divided into objective variables and latent variables. Objective variables directly come from public fields, mainly including order creation time, order status, expected delivery time, actual delivery time, comment score, comment title, comment body, product category and consumer region. This part of the variables undertake two tasks: one is to describe the basic situation of transaction completion and performance, and the other is to provide directly callable observation indicators for subsequent grouping comparison and robustness test. Among them, the performance is characterized by the difference between the actual delivery date and the expected delivery date, and the comment feedback is characterized by the review score and the text content.

The potential variables mainly correspond to the scene features concerned in this paper but not directly given in the public trading table, including authenticity display, interaction quality, guarantee signal and consumer trust. In order to enable these concepts to enter the subsequent empirical analysis, this paper combines the original fields into computable content, guarantee and trust indicators. The content side gives priority to the use of short video description, playback volume, comments, likes and shares to construct the front-end communication agent indicators; The interactive side gives priority to using live interactive records to depict the interaction density between users and anchors; The guarantee side mainly extracts approximate indicators based on the performance time limit, order status and after-sales expression in the comments; The trust side was measured by combining the comment score, evaluation text and supplementary questionnaire. At this stage, the public data package has been able to support the basic identification of transaction results, performance and trust agents. In the future, if the secondary samples and questionnaire samples of the platform field are added, they can continue to expand using the same variable framework. See Table 2 for the corresponding relationship among core variables, key measurement points and data sources:

Table 2: Core variables and sources

Variable	Code	Measurement focus	Source
Content mechanism	SVP / LIQ / ASV	preheating, interaction, authenticity display	Platform coding + survey
Assurance mechanism	FTA / PVT	traceability, fulfillment, price–value transparency	Platform coding + survey
Consumer trust	Trust	competence, integrity, benevolence	Survey
Purchase outcome	Conv	purchase, repurchase, recommendation	Survey
Controls	CV	platform, category, streamer type, age, income, purchase frequency	Survey + platform profile

Table 2 puts the front-end content, live broadcast process, guarantee mechanism, trust structure and purchase results into the same variable framework, providing a unified caliber for subsequent path estimation and configuration identification. In order to integrate short video content, live interaction, order fulfillment and comment feedback into the same research object, this paper first completes data organization, sample construction and variable mapping, and its principle is shown in Figure 1:

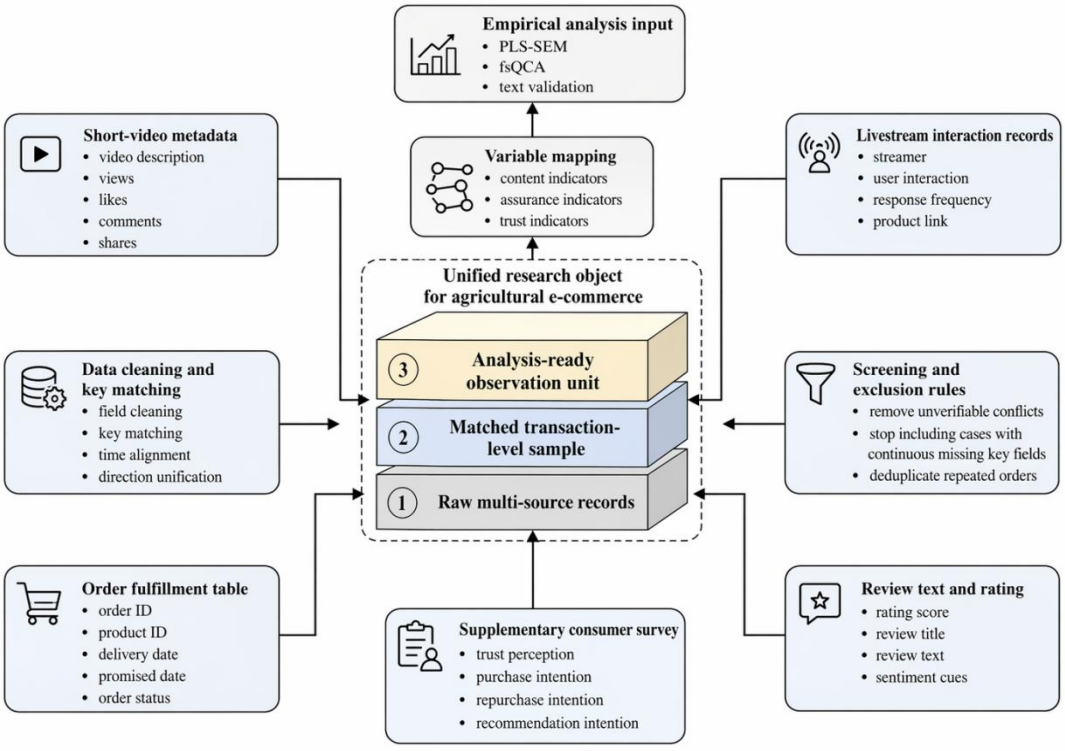

Figure 1: Data organization and sample construction for agricultural e-commerce enabled by "Short Video + Livestreaming"

2.2 Integrated Framework of Mode Innovation and Consumer Trust Building

Trust formation in online trading of agricultural products does not occur at a single point in time. Consumers usually contact the commodity and origin information through a short video first, then make a more detailed judgment in the live studio, and finally correct the previously

formed expectations in combination with delivery, arrival and after-sales experience. Therefore, this paper defines "short video+live broadcast" as a set of continuous operation of the transaction organization mechanism, and puts the mode innovation on four links: short video preheating is responsible for establishing a cognitive portal in advance, live interaction is responsible for compressing information uncertainty, and contract performance and traceability guarantee are responsible for making commitments to verifiable objects. The three work together on consumer trust and further affect purchase conversion, repurchase intention and recommendation intention.

Among them, the short video preheating bears the pre information organization function. For agricultural products, before entering the live studio, consumers often have formed the first round of judgment on the production environment, planting conditions, picking status, packaging methods and the host image through video images. If the short video can more completely present the origin, operation process and product status, it will be easier for consumers to form clear quality expectations before entering the live studio. Live interaction assumes the function of instant verification. The focus of consumers' attention in the live studio is not exactly the same. Some people are more concerned about whether the picture can see the details, some people are more concerned about whether the anchor is willing to directly respond to questions, and some people are more concerned about whether the specification, grade and delivery time are sufficiently specific. The research on interactive trust shows that the response speed, the completeness of interpretation and the interactive experience will directly modify users' judgments on goods and sellers [12, 13].

Only content display and live response are still not enough to support stable trust. Another key link in the transaction of agricultural products is whether the guarantee of performance and traceability is clear enough. Whether consumers are willing to turn their favors in a live studio into orders depends largely on whether the subsequent risks can be controlled. If the commodity source is traceable, the grade description is clear, the cold chain or packaging information is complete, and the delivery time is clear, consumers' concern about the transaction cash will be significantly reduced; If these information is missing, even if the interaction between live broadcasts is active, trust may remain at the level of short-term attitude, and it is difficult to turn into a stable purchase. Research on platform trust and trust transfer shows that the technical conditions and institutional arrangements in the transaction will significantly affect the final judgment of consumers on the entire platform and sellers [11, 14].

Based on the above analysis, this paper divides consumer trust into three dimensions: ability trust, integrity trust and goodwill trust. Ability trust corresponds to whether the seller can explain the goods clearly and execute the order in place; Whether the displayed content corresponding to integrity and trust is consistent with the actual goods; Goodwill trust corresponds to whether the seller is willing to take the initiative to deal with problems. Short video preheating is easier to affect ability trust and integrity trust first, because consumers are mainly exposed to commodity information and seller expression at the front end; Live interaction will further affect the three types of trust, especially amplify the trust of integrity and goodwill; The guarantee of performance and traceability is more related to whether the trust of good faith can be confirmed and whether the trust of good faith can be maintained. When the three types of trust accumulate to a certain extent, it is more likely to promote the purchase conversion, repurchase intention and recommendation intention to rise synchronously.

Accordingly, this paper puts forward the following research hypotheses.H1: short video preheating intensity has a significant positive impact on consumer trust. H2: the quality of live interaction has a significant positive impact on consumer trust. H3: the level of compliance and traceability protection has a significant positive impact on consumer trust. H4: consumer trust has a significant positive impact on purchase conversion. H5: consumer trust plays an

intermediary role in the process of short video preheating, live interaction and performance security affecting purchase transformation. H6: short video preheating, live interaction and performance security do not work in isolation from each other. The joint occurrence of the three is more likely to form a high trust and high transformation mode. Short video preheating, live interaction and performance security will not independently affect consumer judgment, and their synergy framework is shown in Figure 2.

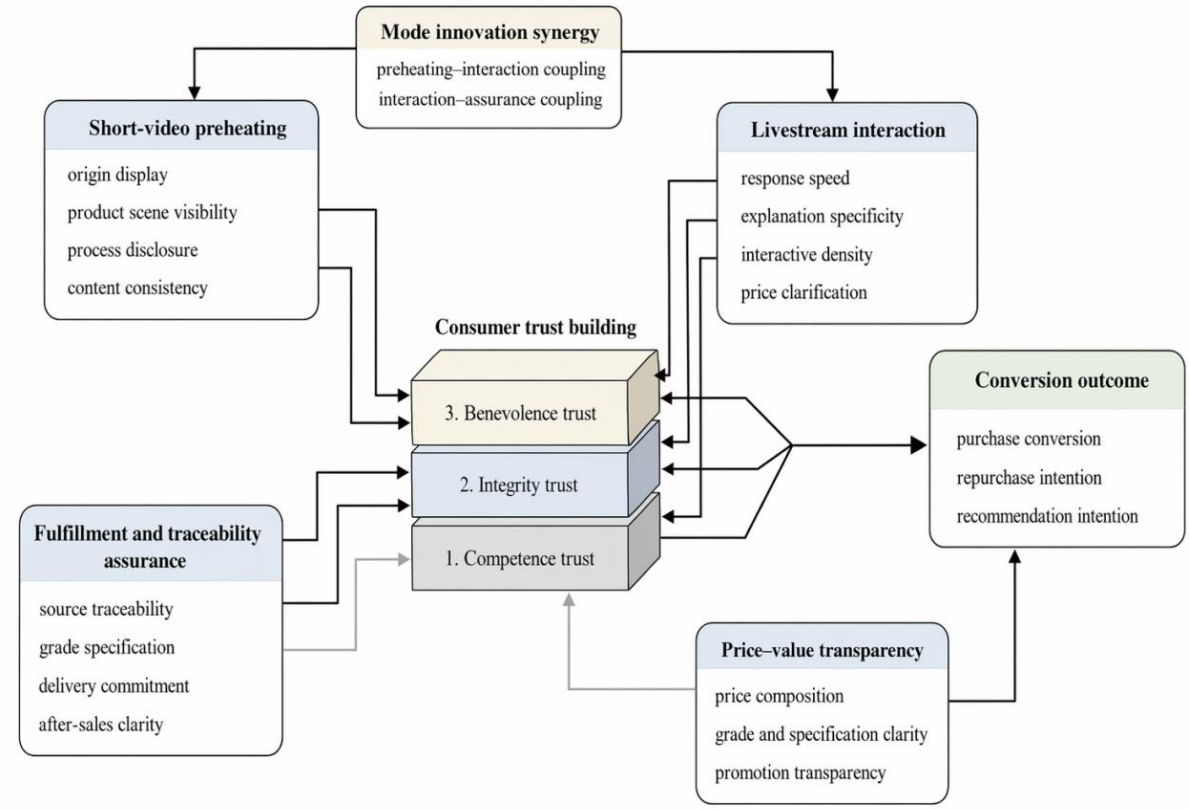

Figure 2: Integrated framework of mode innovation and consumer trust building

2.3 Empirical Strategy, Configuration Analysis, and Robustness Protocol

The empirical identification of this paper is divided into four steps. First, test the net effect on the matching samples of the questionnaire and the platform, and answer whether the short video preheating, live interaction, performance and traceability guarantee significantly promote consumer trust and further drive the purchase transformation. Secondly, identify the combination of conditions on the secondary samples of the field, and answer which types of configurations support high trust and high transformation. Thirdly, the comment text is accessed to the external verification to check whether the trust expression, performance evaluation and emotional tendency in the text are consistent with the direction of the main model. Finally, the stability of compaction results is improved through alternative variables, grouping estimation, abnormal sample elimination and reverse verification. As for the joint use of structural equation and configuration analysis in live broadcast e-commerce, existing studies have proved that it can better identify direct effects and path combinations at the same time [15-17].

In the part of net effect test, PLS-SEM is used to estimate the path relationship between potential variables. This method is suitable for dealing with the multi-dimensional potential variables of content side, interaction side, support side and trust side, and can identify the direct

effect and intermediary effect at the same time. Before model estimation, test item load, internal consistency, aggregate validity, discriminant validity and collinearity at the measurement level, and then enter the structure level estimation. This paper first examines the impact of short video preheating, live interaction, performance and traceability protection on consumer trust. The core relationship is shown in formula (1):

$$Trust_i = \alpha_0 + \alpha_1 SVP_i + \alpha_2 LIQ_i + \alpha_3 FTA_i + \alpha_4 PVT_i + \boldsymbol{\alpha}_5^{\top}\mathbf{Z}_i + \varepsilon_i \quad (1)$$

Among them, $Trust_i$ the comprehensive trust level of the ith interviewee, which is respectively represented by ability trust, integrity trust and goodwill trust; SVP_i, LIQ_i, FTA_i and PVT_i respectively indicate the preheating intensity of short video, the interactive quality of live broadcast, the guarantee of performance and traceability, and price transparency; $\mathbf{Z}_i$ is the control variable vector, including platform type, category type, anchor identity, age, income, purchase frequency and online shopping experience; ε_i is a random disturbance term.

When identifying the transmission relationship between trust and purchase, this paper further estimates the purchase result as shown in formula (2):

$$Conv_i = \beta_0 + \beta_1 Trust_i + \boldsymbol{\beta}_2^{\top}\mathbf{X}_i + \mu_i \quad (2)$$

Among them, $Conv_i$ represents the result of purchase conversion. In the main model, purchase intention is the core outcome variable, and the robustness part is replaced by repurchase intention and recommendation intention; $\mathbf{X}_i$ includes short video preheating, live interaction, performance and traceability guarantee and related control variables; μ_i random perturbation term. The mediation effect was partially completed by bootstrap resampling test.

The path coefficient alone is not enough to explain the complex decisions in the scene of live broadcast of agricultural products. High trust is not necessarily triggered by a single condition, and there may be substitution and complementarity between different conditions. Therefore, this paper further uses fsqca to identify the sufficient configuration on the secondary samples. The specific approach is to calibrate the short video preheating, live interaction, performance and traceability guarantee, price transparency and consumer trust to the [0,1] range, and then take high trust and high transformation as the result set respectively to identify which combination of conditions can stabilize the target results. This paper uses consistency as the main judgment index, as shown in formula (3):

$$Cons(X \Rightarrow Y) = \frac{\sum_i \min(X_i, Y_i)}{\sum_i X_i} \quad (3)$$

where X_i represents the set membership of the ith sample on a combination of conditions, and Y_i represents the membership of the sample on the result set. This indicator is used to measure the adequacy of the result set of a combination of conditions; When reporting the configuration results, the coverage is also given to explain the interpretation scope of the combination to the result set.

In the part of text emotional consistency verification, this paper treats the comment text as an external verification layer instead of directly replacing the main model. The specific approach is to extract the expressions directly related to trust in the comment area and commodity evaluation, including positive phrases such as "true", "assured", "fresh", "fast delivery" and "consistent with the description", as well as negative phrases such as "wrong goods", "slow delivery", "poor packaging" and "after-sales delay"; Then aggregate the text tendency according to the commodities or sessions, and compare it with the trust score, performance indicators and purchase results in the main model. If the main model shows that

the performance and traceability guarantee have a positive effect on trust, then the corresponding samples should have more frequent expressions such as "clear source", "timely arrival" and "consistent live broadcast" at the comment level; If there is a continuous deviation in the text layer, it is necessary to return to the original sample to check whether there are abnormal fields, evaluation extrusion or category mixing problems.

Robustness and error analysis are carried out at four levels. First, replace the result variable, re estimate the proxy results of repurchase intention, recommendation intention and comment score respectively, and check whether the conclusion remains in the same direction. Second, replace the caliber of the core explanatory variables, such as replacing part of the guarantee index with the performance evaluation in the review, and replacing part of the preheating intensity index with the content interaction quantity, to observe whether the path direction is stable. Third, make an inter group estimation by platform, category and anchor identity, and check whether there is a significant difference between shuaiyin and Kuaishou, fresh fruits and vegetables and processed agricultural food, and between rural households and business anchors. Fourth, eliminate and recalculate the text samples of high flow extreme scenes, significantly delayed performance orders and abnormal emotional concentration, and check whether the main results are pulled by a small number of extreme observations.

In order to simultaneously identify the net effect, condition configuration and external consistency, this paper incorporates path estimation, configuration identification, text review and robustness test into the same empirical framework, and the identification process is shown in Figure 3:

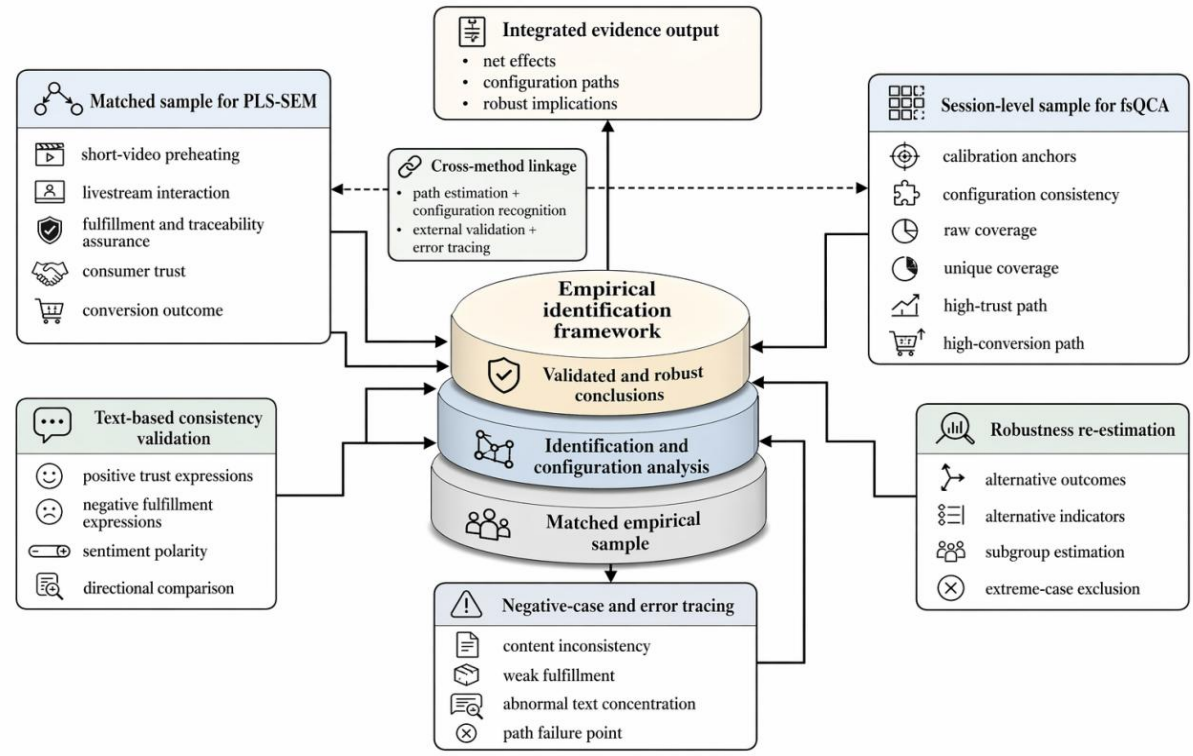

Figure 3: Experimental protocol and validation framework

3 Results and Discussion

3.1 Main Effects of “Short Video + Livestreaming” on Consumer Trust and Purchase Conversion

This section answers two questions: first, among the short video preheating, live interaction, performance and traceability guarantee, which mechanisms can more directly promote consumer trust; Second, what factors mainly affect the transformation itself rather than trust after entering the purchase result end. Before entering the main path test, the reliability and validity of the scale were tested. The results are shown in Table 3:

Table 3: Reliability and validity summary

Construct set	Cronbach’s alpha	CR	AVE
Content and assurance constructs	0.841–0.912	0.883–0.931	0.603–0.729
Consumer trust	0.904	0.927	0.681
Purchase conversion	0.868	0.896	0.632
Discriminant validity	HTMT max	—	0.807

The scale quality of the sample reached an acceptable level, Cronbach's alpha was 0.841 – 0.912, combined reliability was 0.883 – 0.931, ave was 0.603 – 0.729, all item loads were higher than 0.70, and the highest HTMT value was 0.807, indicating that there was good internal consistency and discrimination among the constructs.

From the perspective of trust equation, the impact of performance and traceability guarantee is the strongest, and the standardized path coefficient is 0.337 ($p<0.001$); The interaction quality of live broadcast was the second, and the path coefficient was 0.281 ($p<0.001$); The preheating intensity of short video is also significantly positive, and the path coefficient is 0.191 ($P=0.002$). In contrast, the direct effect of price transparency on consumer trust is weak, and the path coefficient is 0.074 ($P=0.118$), which does not reach a significant level in the main model. This result shows that what really pushes consumers from "willing to see" to "willing to believe" is not the price explanation itself, but whether the source is visible, whether the response is up-to-date, and whether the commitment is tenable. Compared with the research on the purchase intention and repurchase intention of agricultural products' live broadcast system design, anchor features and visual packaging, the current results more clearly distinguish between "first form trust" and "then promote transformation" [18-20].

From the perspective of the correspondence between authenticity display and trust, the higher the score of source visibility and real job display, the more obvious the rise in the average consumer trust, with a fitting slope of 0.43 and an explanation degree of 0.31. The higher the response speed and explanation specificity, the higher the trust score; When the average response delay was controlled within 20 seconds, the predicted trust value increased from 3.46 to 4.02, while the trust improvement slowed down significantly after the response delay exceeded 60 seconds. The role of the guarantee signal is more clear in the heat map: when the traceability display intensity and the clarity of the performance commitment are at the same high level, the average trust score of the sample reaches 4.23; When the source description is insufficient and the delivery commitment is vague, the average trust score is only 3.08. What is reflected here is not the difference in abstract attitudes, but whether consumers can obtain enough clear, consistent and verifiable information at key nodes. After the measurement quality passes the inspection, the main path relationship between short video preheating, live interaction, guarantee signal and purchase results is shown in Figure 4 and table 4:

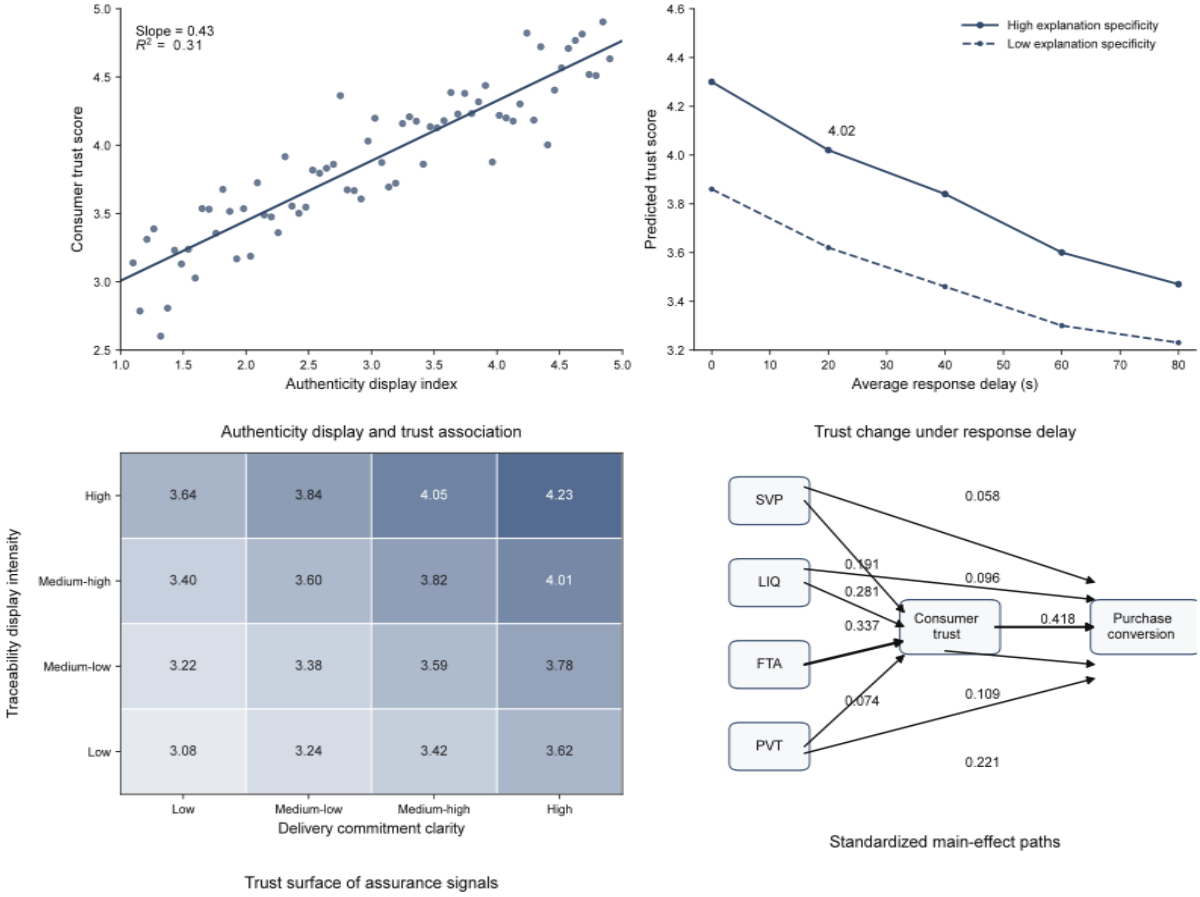

Figure 4: Trust formation effects of authenticity, interaction, and assurance signals

Table 4: Main path results

Path group	Core result	Coefficient	p-value
Trust formation	FTA → Trust	0.337	<0.001
Trust formation	LIQ → Trust	0.281	<0.001
Trust formation	SVP → Trust	0.191	0.002
Direct conversion	PVT → Conversion	0.221	<0.001
Core mediation	Trust → Conversion	0.418	<0.001

The purchase result equation has a different structure from the trust equation. Consumer trust has the strongest direct impact on purchase transformation, with a standardized coefficient of 0.418 (p<0.001), indicating that trust is still the core intermediary driving purchase. At the same time, price transparency has a significant direct effect on purchase conversion, and the path coefficient is 0.221 (p<0.001); The interaction quality of live broadcast also retained a weak but significant direct impact, and the path coefficient was 0.096 (P=0.034). In contrast, the direct effect of short video preheating intensity on purchase conversion was not significant, and the path coefficient was 0.058 (P=0.147); Although performance and traceability guarantee still have a positive effect on purchase conversion, the direct coefficient decreases to 0.109 (P=0.026), which is significantly lower than its effect on trust. This shows that the short video preheating and protection mechanism is more to promote the accumulation of trust in the front and middle, while the price transparency is closer to the single trigger, which has a more direct impact on whether consumers complete the purchase immediately. Compared with the research on purchase intention and brand design of live broadcast of green agricultural products, the

current results also show that price and value interpretation will enter the order decision faster, but will not automatically precipitate into stable trust [21, 22]

The mediating effect further makes this distinction realistic. The indirect effect of short video preheating on purchase transformation through consumer trust was 0.080 (p=0.004), the indirect effect of live interaction quality was 0.117 (p<0.001), and the indirect effect of performance and traceability guarantee was 0.141 (p<0.001), all of which were significantly positive. The indirect effect of price transparency through trust is only 0.031 (P=0.109), which does not reach a significant level. In other words, price explanations, specifications and preferential information will directly affect whether consumers place orders, but will not continue to accumulate trust like source display, interactive response and performance guarantee. In order to further distinguish the difference between the effects of "first raising trust" and "directly pushing orders", the direct effects and indirect effects of each mechanism are decomposed as shown in Figure 5:

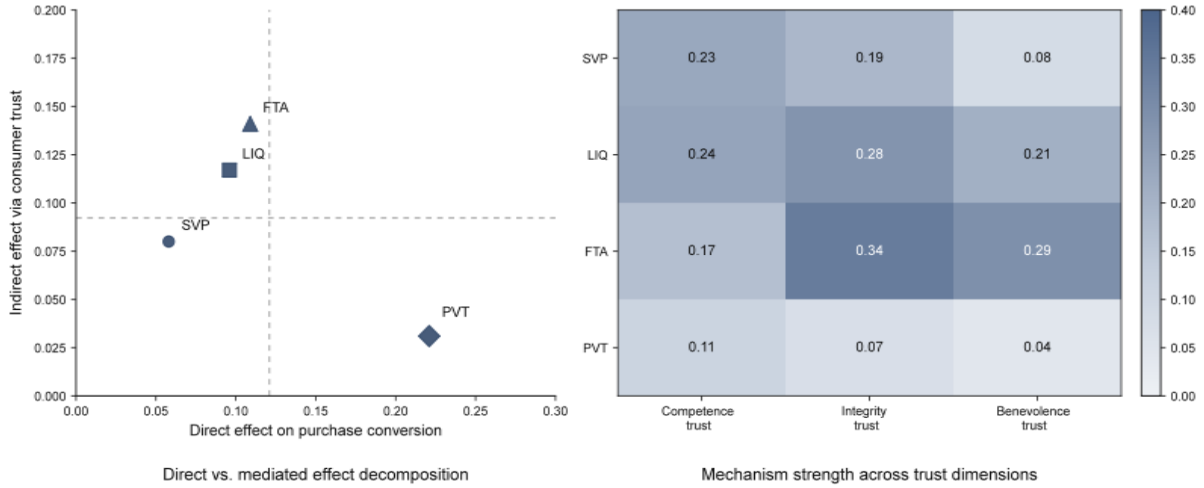

Figure 5: Decomposed direct and mediated effects of trust-building mechanisms on purchase conversion

In summary, the results of this section can be summarized into two points. First, the core mechanisms that significantly enhance consumer trust are performance and traceability guarantee, live interaction quality and short video preheating intensity, and the former two are more stable and stronger. Second, the factor that directly affects the purchase transformation rather than mainly through trust transmission is price transparency; It can significantly affect the order making decision, but its contribution to trust accumulation is limited.

3.2 Analysis of ablation experiments

3.1 it has been stated that performance and traceability guarantee, live interaction and short video preheating will affect consumer trust with different intensities, and price transparency will more directly affect orders. Next, we need to further answer whether high trust and high transformation correspond to the same optimal path, or whether they will differentiate into several types of coexistence modes under different combinations of conditions. Therefore, this paper conducts fsqca recognition on the secondary samples, and takes high trust and high transformation as the result set respectively to observe the common occurrence of different conditions. The results show that these two kinds of results are not derived from a single condition, and there is no unique optimal path covering all samples; On the contrary, both high trust and high transformation are multi-path coexistence, but the core conditions of the two are

not completely coincident.

From the high trust results, the consistency of the overall solution is 0.901, and the overall coverage is 0.684, indicating that the currently identified configuration can stably explain the high trust samples. High trust mainly includes three types of paths. The first type can be summarized as "authenticity guarantee steady-state type", whose core conditions are sufficient source display, specific live response, clear guarantee of performance and traceability, original coverage of 0.284 and consistency of 0.924. The second type can be summarized as "content traction interactive verification type", whose core conditions are strong preheating of short video, high authenticity display, dense live interaction, original coverage of 0.247 and consistency of 0.911. The third type can be summarized as "guarantee and compensation type", whose core conditions are clear guarantee of performance and traceability, complete price description, in place live response, original coverage of 0.221 and consistency of 0.898.

The results of high transformation showed another way of differentiation. The consistency of the global solution is 0.887, and the global coverage is 0.712. The first type of high transformation path can be summarized as "high trust - clear pricing". Its core conditions are high consumer trust, high price transparency, high quality of live interaction, original coverage of 0.301, and consistency of 0.918. The second type of high conversion path can be summarized as "guaranteed cash immediate order type", whose core conditions are high consumer trust, strong guarantee of performance and traceability, clear price description, original coverage of 0.276 and consistency of 0.906. The third type of high transformation path can be summarized as "preheating and innovation - price triggered". Its core conditions are strong preheating of short videos, high price transparency, medium and high level of live interaction, original coverage of 0.233, and consistency of 0.887. Compared with the first two categories, consumer trust in this path is not at the core, which indicates that some sessions can obtain higher orders in a short time by virtue of high-frequency preheating, clear price and better transformation rhythm, but their trust accumulation has not reached the highest level synchronously. In order to further determine whether high trust and high transformation are supported by the same set of conditions, this paper identifies the joint action modes of different combinations of conditions on the secondary samples, and the configuration results are shown in Figure 6:

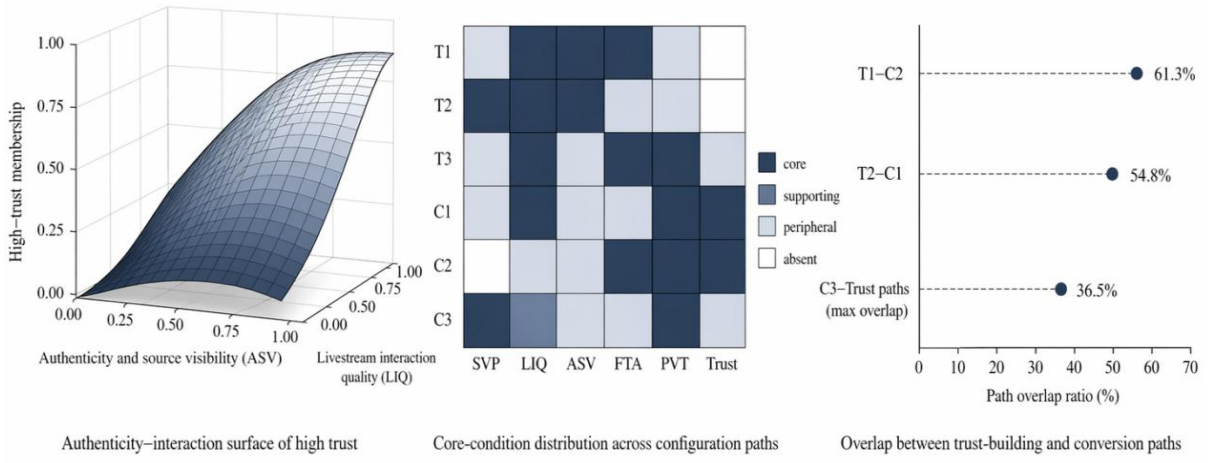

Figure 6: Configuration paths of high-trust and high-conversion modes under "Short Video + Livestreaming".

The three-dimensional surface in Figure 6 (a) further confirms that the generation of high trust is more dependent on the common uplift of authenticity and interaction. When the authenticity display and live interaction are at the high level at the same time, the high trust

membership rapidly rises to more than 0.80; If only one of the two items is on the high side, the high trust level usually stays around 0.55, and it is difficult to enter the stable high range. The core conditions within the high trust path are more concentrated in authenticity, security and interaction, while it is easier to see the rise of price transparency as the core condition within the high transformation path. In relevant studies, brand design, government trust and value interpretation have been proved to change consumers' acceptance of green agricultural products or short video marketing content [22, 23], but this study further shows that they have different ways to enter high trust and high transformation.

See Table 5 for the configuration path, consistency and coverage results of high trust and high transformation:

Table 5: Configuration summary

Outcome	Representative path	Core conditions	Consistency	Raw coverage
High trust	T1	High ASV + High LIQ + High FTA	0.924	0.284
High trust	T2	High SVP + High ASV + High LIQ	0.911	0.247
High conversion	C1	High Trust + High PVT + High LIQ	0.918	0.301
High conversion	C2	High Trust + High FTA + High PVT	0.906	0.276
Solution summary	High trust / High conversion	overall consistency = 0.901 / 0.887	—	0.684 / 0.712

Table 5 shows that both high trust and high transformation are supported by multiple paths, in which high trust is more dependent on the joint rise of authenticity, interaction and protection, and high transformation is easier to superimpose price transparency.

The overlapping relationship between the two results is also clear. The overlap of high trust path T1 and high conversion path C2 is the highest, which is 61.3%, indicating that the sessions with "sufficient authenticity, clear guarantee and specific response" are also more likely to form stable orders. The overlap between T2 and C1 is 54.8%, indicating that the sessions with strong front-end content and sufficient interactive verification can also be converted to higher transactions when the price explanation is in place. In contrast, the maximum overlap between C3 and any high trust path is only 36.5%, indicating that although "preheating and innovation - price trigger" can bring orders, it does not automatically correspond to high trust. It can be confirmed that high trust and high transformation are not the same thing. They have intersection, but do not automatically coincide.

3.3 Heterogeneity, Negative Cases, and Deployment Implications

3.1 and 3.2 have explained that high trust and high transformation are supported by a variety of conditions, but these paths will not maintain the same intensity in all scenarios. What we need to answer next is, when the platform mechanism, category attributes, anchor identity and performance conditions change, which paths are more stable and which locations are most likely to fail. Around this problem, this paper conducts group estimation, negative case review and condition review at the deployment level.

First look at the platform differences. Among the dithering samples, the "content traction interactive verification" path is the most stable, with a configuration consistency of 0.918 and

an original coverage of 0.296; The corresponding grouping path coefficient shows that the impact of short video preheating on consumer trust is 0.243, which is significantly higher than 0.131 in the fast hand group. In the fast hand sample, the "authenticity guarantee steady state" is more stable, with the configuration consistency of 0.926 and the original coverage of 0.311; The impact of performance and traceability guarantee on trust reached 0.364, which was higher than 0.298 in the dither group. This shows that fast hand users are more sensitive to the source description, delivery commitment and after-sales cash, and the support of guarantee information for trust is stronger.

Category differences further magnified this result. In the fresh fruit and vegetable samples, the path of "guaranteed cash immediate order" is the most stable, with a consistency of 0.931 and an original coverage of 0.322; The direct impact of performance and traceability protection on purchase conversion was 0.187, and the impact on trust was 0.356, which were the highest in all categories. In the grain and oil dry cargo samples, the path distribution is relatively balanced, and the "authenticity guarantee steady state" and "high trust clear pricing" both maintain high coverage. Processed products with regional characteristics rely more on "content traction interactive verification", indicating that such products rely more on story content, origin memory and anchor interpretation to complete the value description.

The anchor identity will also change the effective order of the path. In the rural household anchor sample, the "authenticity guarantee steady-state" is the most stable, with an original coverage of 0.309 and a consistency of 0.929. In the merchant anchor sample, "high trust - clear pricing" is more prominent, and the direct effect of price transparency on purchase conversion rose to 0.264, higher than 0.173 for the farmer anchor. The path of the master anchor is the most unstable, and its high conversion is more likely to fall in the "preheating and innovation - price trigger". Short-term orders can rise, but the coverage of the high trust path is only 0.193, which is significantly lower than that of rural households and businesses. The research on social scenarios and privacy concerns points out that the social environment variables in live e-commerce will significantly change consumers' final acceptance of platforms and sellers [24]; In this paper, this change is further reflected in the difference of trust precipitation ability of different anchor types.

After the change of performance conditions, the location of path failure becomes clearer. According to the difference between the actual delivery time and the promised delivery time, the samples are divided into three groups: low deviation, medium deviation and high deviation. In the low bias group, the first three types of high trust paths can maintain high consistency, and the lowest is still 0.892; Once in the high deviation group, the consistency of "content traction interactive verification" quickly dropped to 0.811, and the coverage dropped by 0.087. "Preheating innovation price trigger" failed first in the high conversion results, and its consistency dropped to 0.784. With the increase of content distortion and performance delay at the same time, the trust attenuation increases rapidly; When both are high, the trust decline value is close to 1.2 scale points. Blockchain food traceability research shows that when consumers can obtain verifiable information at the source and performance location, product trust and purchase intention will be significantly improved [25]; This article further explains that once these positions deviate, the advantages brought by the front-end content and price will be quickly offset. See Table 6 for the comparison between the stable path and the main failure positions under the changes of platform, category, anchor identity and performance conditions.

Table 6: Heterogeneity and failure summary

Scenario	Most stable path	Core message
Douyin / Kuaishou	T2 / T1	Douyin relies more on content–interaction; Kuaishou relies more on authenticity–assurance
Fresh fruits and vegetables	C2	most sensitive to fulfillment and traceability
Farmer / Merchant / Influencer	T1 / C1 / C3	farmer builds trust more easily; influencer converts faster but accumulates less trust
High fulfillment deviation	no fully stable path	T2 drops to 0.811; C3 drops to 0.784
Delay > 48 hours	—	repurchase 3.94 → 3.21; recommendation 3.88 → 3.07

Table 6 further shows that the path stability will be reordered under different scenarios, and the most concentrated failure positions are insufficient specification explanation and large performance deviation. Under the change of platform, category, anchor identity and performance conditions, the stability of each high trust and high transformation path will be reordered, and its heterogeneity results and failure location are shown in Figure 7.

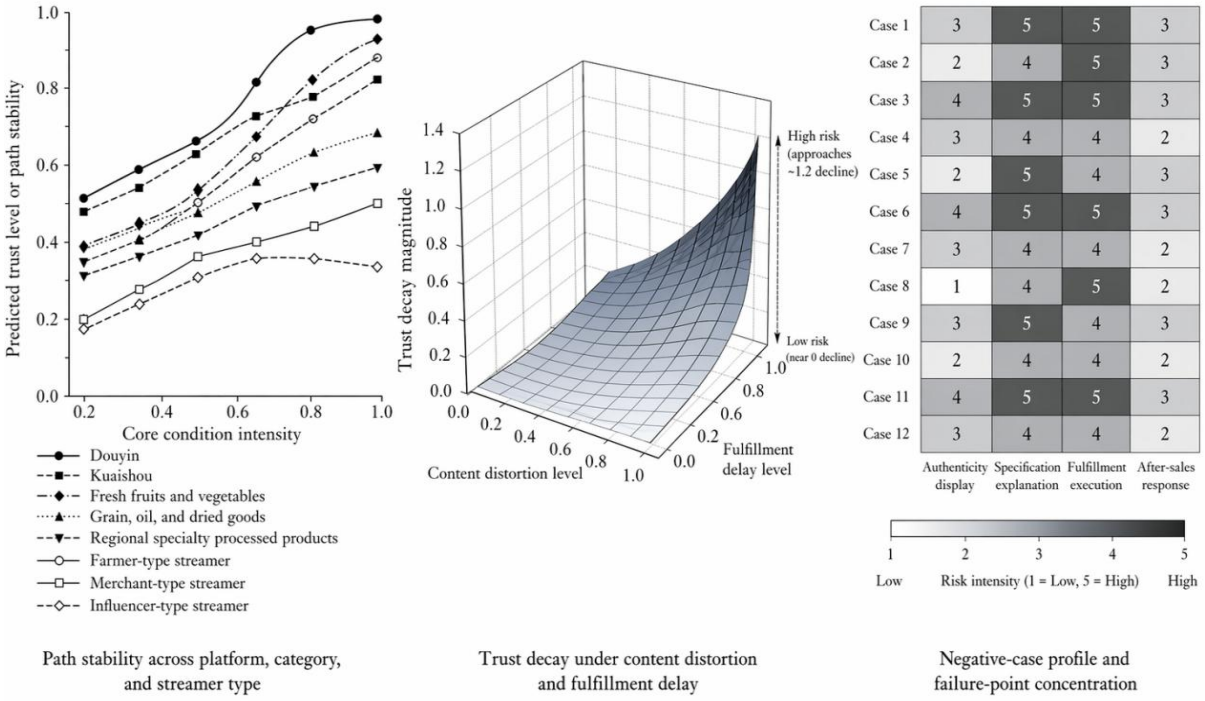

Figure 7: Heterogeneity, trust decay risk, and representative negative cases

From the deployment side, the heterogeneity results can be further compressed into the scenario configuration diagram. For the dithering scene, the priority is to stabilize the "content traction - Interactive verification", but the specification, grade and delivery boundary should be realistic in advance to avoid the content pulling the expectation too high. For the fast hand scenario, the priority is to stabilize the "authenticity - guarantee steady state", and put the source description, delivery commitment and after-sales rules in a more prominent position. For fresh fruits and vegetables, the performance and traceability should be taken as the front module, rather than reserved for supplement after ordering; For grain and oil dry goods and processed

products, price explanation and differential explanation should be strengthened. For the rural type anchor, the focus is to supplement the standardized expression and after-sales script; For business anchors, focus on maintaining the credibility of the source display; For the talent anchor, verifiable information and after-sales cashing need to be added, otherwise the high traffic can only be converted into short-term orders, which is difficult to be converted into stable re purchase. After the heterogeneity results are further transferred to the deployment end, the paths that should be preferentially maintained and the positions that need reinforcement in different scenarios can be reduced to the configuration diagram shown in Figure 8.

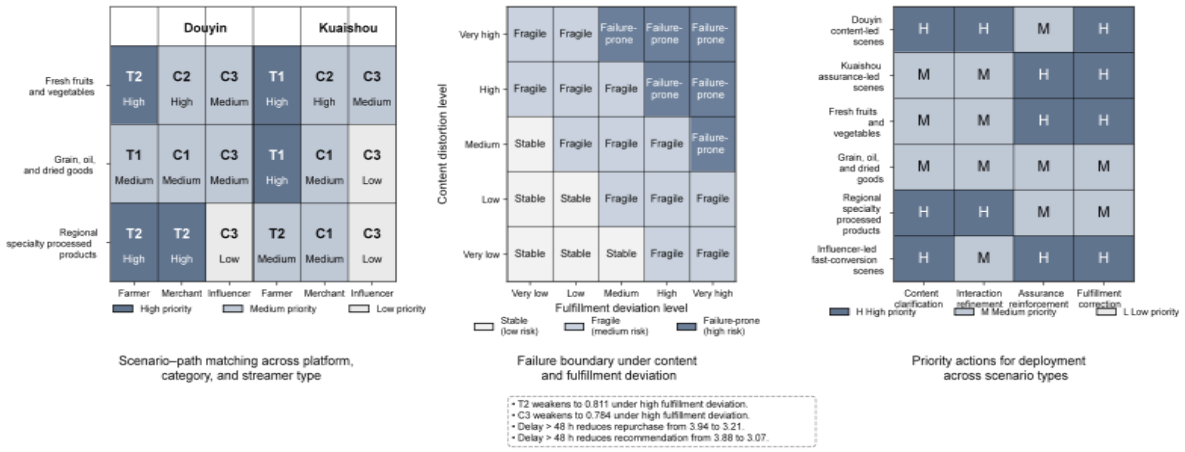

Figure 8: Scenario-based deployment map of trust–conversion paths across platform, category, streamer, and fulfillment conditionst

4 Conclusion

This paper focuses on the operation logic of "short video+live broadcast" enabling the upward movement of agricultural products, focusing on how the content preheating, live broadcast interaction, performance and traceability guarantee work together on consumer trust, and further distinguishes the relationship between high trust and high transformation. The results show that the high-quality growth of agricultural products online trading does not depend on a single flow amplification, but on whether the information is specific enough, whether the response is timely enough, and whether the commitment can be fulfilled. As far as the net effect is concerned, the guarantee of performance and traceability, the quality of live interaction and the preheating intensity of short videos have significantly improved consumer trust, and the guarantee of performance and traceability has the strongest effect; The direct promotion of price transparency to purchase conversion is more obvious, but its contribution to trust accumulation is relatively limited. Further, high trust and high transformation do not correspond to the only optimal path. The two have both intersection and differentiation.

(1) In terms of data organization, this paper combines short video metadata, live interactive records, order fulfillment form and comment text into the same research framework, and tries to reduce the fracture between content, transaction and feedback. Around this framework, the article mapped short video preheating, live interaction, authenticity display, performance and traceability protection, price transparency, consumer trust and purchase results to observable objects in turn, and established a reproducible evidence chain among platform samples, questionnaire samples and text samples. After such treatment, consumer trust will no longer remain at the level of abstract attitude, but can correspond to the front-end content presentation, the middle-end interactive interpretation and the back-end performance one by one.

(2) In this paper, two evidence paths, net effect and conditional configuration, are retained in the identification method. PLS-SEM is used to describe the direction and intensity of various factors' trust in consumers and purchase transformation, fsqca is used to identify the conditions that support high trust and high transformation, and the comment text is used to review the external consistency. The conclusion is closer to the real operation mode of the live broadcast scene of agricultural products: high trust is more dependent on authenticity, interaction and protection, and high transformation is easier to form by superimposing price transparency on the basis of high trust, but there may also be paths that rely on preheating and price to quickly trigger orders, but do not synchronously precipitate trust. This means that "fast selling" and "trustworthy" are not always established at the same time, and a truly stable upward model of agricultural products needs to be consistent between content organization, transaction interpretation and fulfillment.

(3) The application value of this paper mainly falls on the deployment level. For platforms and operators, the task of the short video is to clarify the origin, product status and quality clues in advance. The task of the live broadcast is to explain the specifications, grades, prices and risks. The task of the performance and traceability mechanism is to compact the positive judgments formed in the front into verifiable commitments. After the platform, category, anchor identity and performance conditions change, the stability of the path will be significantly differentiated: the buffeting scene is more dependent on content preheating and interactive verification, and the fast hand scene is more dependent on authenticity and guaranteed cash; Fresh fruits and vegetables are more sensitive to contract deviation, and processed products with regional characteristics are more dependent on value description; Talent anchors are easier to obtain short-term orders, and rural and business anchors are easier to deposit stable trust. The limitations of this paper are also clear: the coverage of the public sample for the integration of short video and live broadcast in China is still limited, and some potential variables still need to rely on proxy indicators and supplementary questionnaires; The follow-up research can continue to expand the secondary tracking data of the field, add the re purchase cycle, return records and more detailed category differences to further test the sustainability of the high trust path under different platform rules and supply chain conditions.

About the Author

Linlin Han is a university lecturer who graduated from Heilongjiang University with a major in E-Commerce. Her long-term research and practice focus on the field of rural e-commerce, with particular emphasis on emerging areas such as short video operations for agricultural products and live-stream marketing. She is dedicated to exploring pathways for agricultural product brand building and marketing innovation in the era of the digital economy, aiming to contribute to rural revitalization and the upgrading of rural industries. She teaches courses related to e-commerce, emphasizing the integration of theory and practice to cultivate students' innovative thinking and practical skills.

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