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High Willingness, Low Conversion: Demand and Supply Constraints on Digital Income Transformation in a Beijing Mountain Village

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ABSTRACT

Rural China has invested heavily in digital infrastructure, but many villages still sell very little online. This paper examines that gap in Hebei Village, a shallow-mountain village in Fangshan District, Beijing. The village cooperative has a livestream account, a three-person team and a differentiated millet product, yet online sales account for only about 2.5% of revenue. We combine a survey of 125 consumers, which included a short information treatment, with five interviews and cooperative sales records. Although 44.8% of respondents had never heard of the village's products, 66.4% expressed willingness to buy and 88.0% accepted fixed pricing; the 56 respondents who had never heard of the village read a short introduction before answering, and their willingness rate (57.1%) was below that of respondents with prior familiarity (73.9%). Willingness did not carry through to channel use. Only 26.4% preferred livestreaming, while community group buying and platform e-commerce, neither of which the village operates, were each preferred by 50.4%. Interviews identify five supply-side constraints: the absence of brand certification and barcodes, loss-making parcel delivery, limited operational staff, a single-product portfolio and reliance on one platform. The findings suggest that the main obstacle is not consumer interest but the village's capacity to certify, ship and merchandise its products.

KEYWORDS: *rural e-commerce; digital village; conversion bottleneck; agricultural products; livestreaming; Beijing.*

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I. INTRODUCTION

A. Background

China's rural digital infrastructure has expanded quickly. Broadband, mobile coverage and express delivery now reach most villages, and livestreaming has been promoted as a low-cost way for small producers to reach distant buyers. National and municipal policies treat rural e-commerce as a tool for raising farm incomes [9,10]. Research has generally supported this view. E-commerce expansion can lower living costs and connect rural producers to wider markets, although the income gains to producers have been modest [1]. Rural e-commerce development has also been associated with reduced income inequality within rural areas [2]. Chinese studies of agricultural livestreaming report gains in sales and farmer income [11].

B. The Problem

The gains are uneven, however. Studies of Taobao villages show that success depends on local entrepreneurship, social networks and supporting services rather than on connectivity alone [4]. Work on the digital divide makes a similar point: access to technology does not guarantee effective use, and groups with fewer resources are often the last to benefit [3]. In many villages, equipment and accounts are present but sales remain limited.

C. The Case and Research Questions

Hebei Village in Fangshan District, Beijing, offers a clear example. The village cooperative grows millet on terraced fields, runs a WeChat Channels livestream three times a week, and employs a three-person team. Between 2024 and February 2026 it sold about RMB 280,000 of millet, of which only RMB 6,000 to 7,000, or about 2.5%, came from online

sales. Our survey nevertheless found substantial interest among consumers. This contrast motivates two questions. First, how does information provision affect awareness and purchase willingness among consumers who do not know the village? Second, which supply-side conditions prevent that willingness from becoming online sales?

D. Contributions

The paper makes three contributions. It provides a joint demand and supply account of a single village, using primary data from consumers and producers. It treats conversion capacity, rather than digital access, as the variable that links the two. It also offers practical priorities for villages that already have digital infrastructure but lack the organization to use it.

II. ANALYTICAL FRAMEWORK

A. Digital Dividend and Digital Divide

Two literatures frame the issue. The first emphasizes the digital dividend. E-commerce widens market access, reduces search costs and allows small producers to sell beyond local buyers [1,2]. The second emphasizes the digital divide. Benefits depend on skills, social capital and local institutions, and marginal groups may be excluded or captured by intermediaries [3,4]. Both are useful, but neither explains why a village with connectivity, a product and an account still fails to convert interest into revenue.

B. Conversion Capacity

We use the term conversion capacity to describe the organizational layer between digital exposure and income: the ability to certify a product, package it, ship it reliably, handle after-sales service and present it in a form that online buyers accept. This layer is largely organizational rather than technological. A village may possess the technology and lack the capacity.

C. Demand and Supply Framework

Figure 1 presents the framework. On the demand side, consumers move from awareness to interest, willingness, channel choice, purchase and referral [7]. On the supply side, the technology-organization-environment (TOE) framework organizes the conditions under which a village can serve that sequence: platforms and digital tools (technology), staffing, branding and product range (organization), and logistics, certification and market access (environment) [8]. Livestreaming research supports the demand-side link between presentation, trust and purchase intention [5,6]. The framework predicts that a village can record high willingness and low revenue when supply-side conditions are weak. We examine that prediction descriptively.

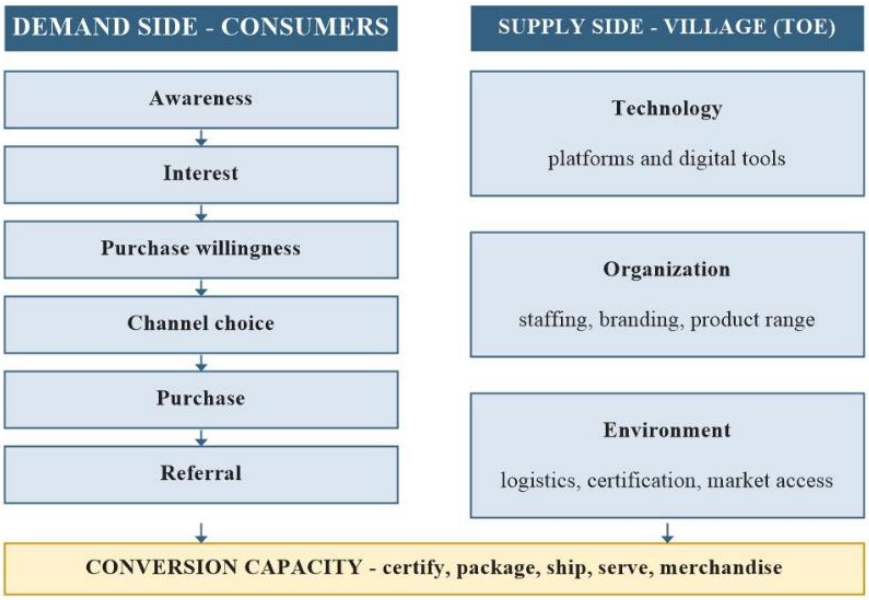


Fig. 1. Demand and supply framework of digital income conversion.

III. CASE AND METHODS

A. Case Setting

Hebei Village is the seat of Hebei Town in Fangshan District, about 45 km southwest of central Beijing. It has 1,233 residents; about 420 are aged 60 or above and about 200 are under 18. The village collective farms 160 mu (about 10.7 hectares) of millet, using varieties introduced from Shanxi under the Beijing-Changzhi pairing programme. Terraced fields, spring-water irrigation and a no-chemical-fertilizer regime are the stated quality advantages. The Huikeqishan Cooperative was established in June 2024, reports more than 100 participating villagers and raised about RMB 700,000. It runs a shop at the village entrance and a WeChat Channels

livestream three times a week. A Red Post Road exhibition hall received about 70 groups and 2,000 visitors in 2025, and cultural tourism has been proposed as a complementary sales channel for local products [12].

The case is suitable for three reasons. Digital infrastructure is already present, so it cannot explain low online sales. The product is differentiated rather than generic. The cooperative also keeps sales records, which allow stated willingness to be compared with realized revenue.

B. Survey

The questionnaire contained 19 items in five blocks: basic information, awareness, demand and preferences, promotion, and suggestions. It was distributed through Wenjuanxing and in person in February 2026. A total of 125 valid responses were collected.

Item 6 asked whether respondents knew the village's products. Those who answered "never heard" (n = 56) were shown a short introduction to the village and its products before continuing, and all 56 did so. Respondents who already knew the village did not see the introduction. The design therefore provides an information treatment for the unaware group. Assignment was not randomized, and the two groups are not equivalent, so we treat the results as descriptive.

C. Interviews

Five semi-structured interviews were conducted on 24-25 February 2026 with the village Party secretary, a returned livestreamer, a cooperative staff member, a free-range egg producer and a braised-fish vendor. Each lasted 40 to 90 minutes and was documented in written transcripts. Transcripts were coded using categories from the TOE framework and categories that emerged during reading, including product range and platform choice.

D. Secondary Data

Cooperative sales records for 2024 to February 2026, the cooperative's subsidy application and exhibition visitor counts provide the outcome measures. These are administrative records rather than audited accounts, and we use them as indicative figures.

E. Analysis and Limitations

Analysis is descriptive. We report frequencies and weighted rankings for all items. Cross-tabulation is limited to groups large enough to support it; the four regional categories are merged into Beijing and outside Beijing because one original category contains only four respondents. No regression or causal claim is made.

Three limitations should be noted. The sample is young and female-skewed: 83.2% of respondents are aged 18-25 and 73.6% are women, reflecting the channels through which the questionnaire circulated. Purchase willingness measures intention, not behavior. The sales records also do not distinguish new from repeat buyers.

IV. RESULTS

A. Sample

Table I summarizes the sample. Respondents are mainly young (83.2% aged 18-25), female (73.6%) and living in Beijing outside Fangshan (44.8%) or outside Beijing (31.2%); 20.8% live in Fangshan. Household food shopping is frequent, with 68.8% buying at least every two to three days, but only 9.6% of respondents are the main purchaser at home. In 79.2% of households, parents or grandparents decide what to buy.

TABLE I. SAMPLE PROFILE (N = 125)

Characteristic	Category	%
Gender	Male	26.4
Gender	Female	73.6
Age	18-25	83.2
Age	26-35	6.4
Age	36-45	3.2
Age	46-55	6.4
Age	56 and above	0.8
Residence	Fangshan District	20.8
Residence	Other Beijing districts	44.8
Residence	Hebei Province	3.2
Residence	Other provinces	31.2
Purchase frequency	Daily	24.0
Purchase frequency	Every two to three days	44.8
Purchase frequency	Once or twice a week	18.4

Purchase frequency	Every two to four weeks	6.4
Purchase frequency	Monthly or less	6.4
Main household purchaser	Self	9.6
Main household purchaser	Spouse	3.2
Main household purchaser	Parents or grandparents	79.2
Main household purchaser	Random arrangement	8.0

B. Awareness

Awareness is low (Fig. 2). Only 8.8% of respondents knew the village's products well and 13.6% knew something about them. A further 32.8% had heard of the village but could not name a product, and 44.8% had never heard of it. Category awareness is uneven: 51.2% named vegetables, 48.0% grain and oil products and 39.2% fruit, while 25.6% named handicraft products and 19.2% could name none.

Exposure to the livestream is thinner. Only 4.8% had watched several times and 34.4% once or twice; 23.2% knew a livestream existed but had not watched it, and 37.6% did not know it existed. The village's main online channel is unknown to more than a third of the sample.

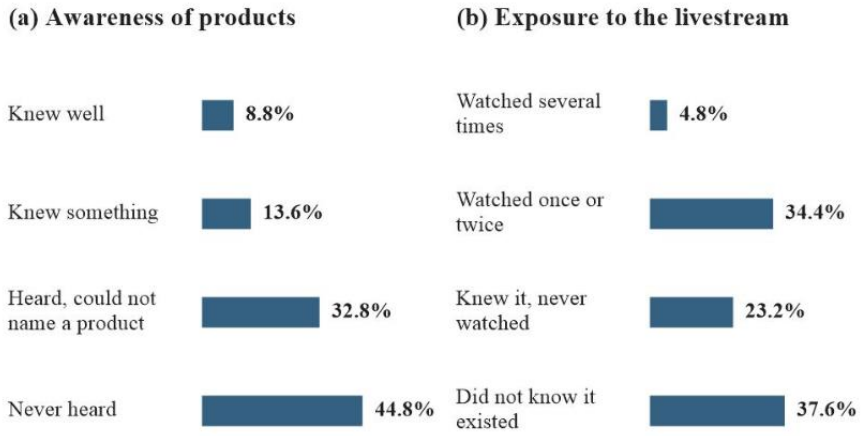


Fig. 2. Awareness of the village and its products.

C. Willingness and Price Format

Willingness was high in the sample as a whole (Fig. 3). Overall, 20.0% of respondents were very willing to buy and 46.4% were somewhat willing, giving 66.4% positive. A further 32.0% were uncertain, and 1.6% were unwilling. Because the 56 unaware respondents read the introduction before answering, their responses describe willingness under information provision; the 69 respondents who already knew the village answered without it. The overall figure should therefore be read as a description of the sample, not as a baseline.

Willingness differed by prior familiarity. It was 73.9% among respondents who already knew the village (51 of 69) and 57.1% among the 56 previously unaware respondents who read the introduction (32 of 56). The bivariate difference is borderline significant ($\chi^2 = 3.90$, df = 1, $p = 0.048$; with Yates' correction, $p = 0.075$). In a binary logit with controls for quality salience, channel preference and residence, the unaware indicator has an odds ratio of 0.53 ($p = 0.109$), so the difference does not survive adjustment (Table II). Because the treatment was not randomized and no pre-treatment measure exists, this comparison describes association rather than effect.

TABLE II. LOGISTIC REGRESSION OF PURCHASE WILLINGNESS

Predictor	Odds ratio	Standard error	p
Unaware of the village	0.53	0.40	0.109
Quality ranked first	1.25	0.44	0.612
Prefers livestreaming	1.64	0.48	0.307
Beijing resident	1.92	0.41	0.107
Constant	1.34	0.49	0.551

Note: n = 125. The dependent variable equals 1 if the respondent was willing to buy (item 12 = 1 or 2) and 0 otherwise. Quality salience equals 1 if the respondent ranked product quality first (91 of 125). Standard errors are those of the coefficients.

Price format is not an obstacle. In total, 22.4% fully accepted a fixed-price model and 65.6% accepted it if prices were reasonable, giving 88.0% acceptance; 12.0% preferred bargaining. Fixed pricing matters because it allows standardized online listing and predictable shipping costs.

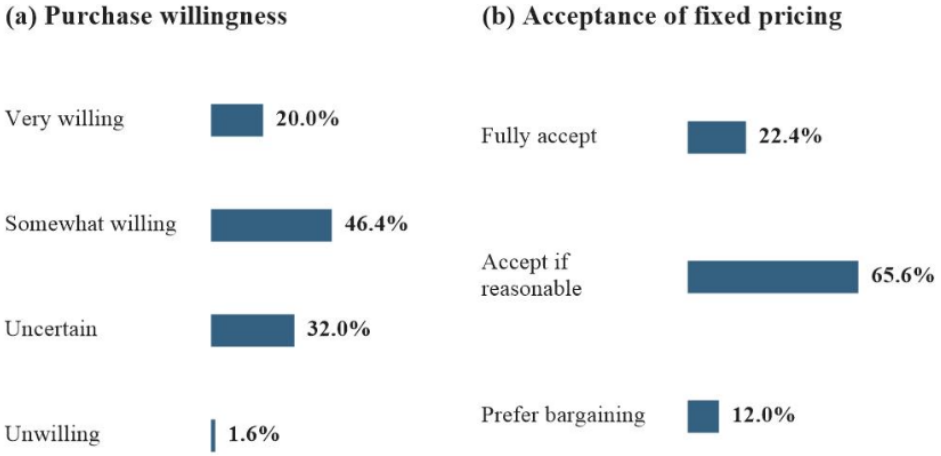


Fig. 3. Purchase willingness and acceptance of fixed pricing.

D. Channel Mismatch

The channel the village uses is not the channel consumers prefer (Fig. 4). Offline shops and farmers' markets were preferred by 75.2%, community group buying by 50.4% and platform e-commerce by 50.4%. Livestreaming was preferred by 26.4% and direct purchase from producers by 20.0%.

The mismatch is direct. Almost all of the cooperative's online sales come from WeChat Channels livestreaming, yet livestreaming ranks fifth among seven purchase channels. Community group buying and platform e-commerce, each preferred by half the sample, are not operated by the village. The cooperative has invested in the channel it finds easiest to run, not the channel its customers prefer.

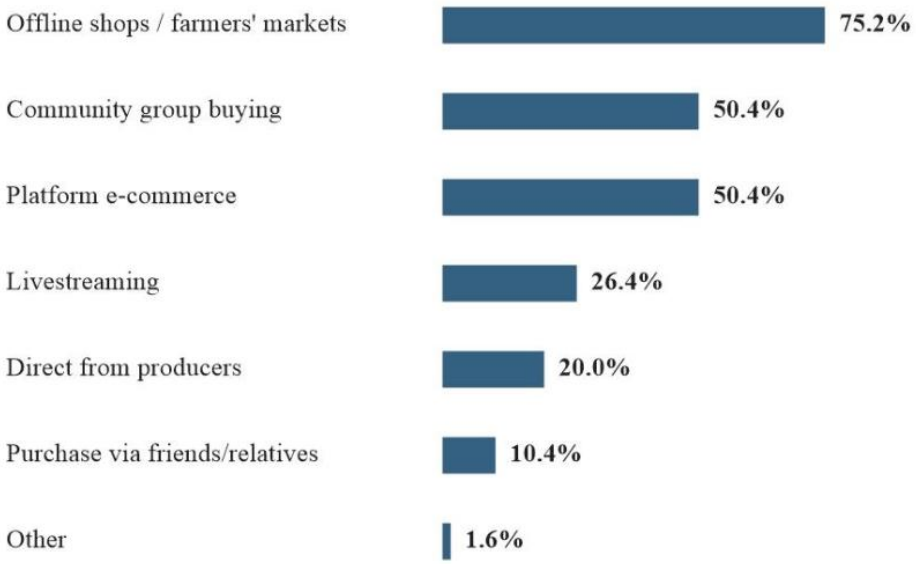


Fig. 4. Preferred purchase channels (multiple response).

E. Quality, Trust and Content

Quality dominates the purchase decision (Fig. 5). In the weighted ranking, product quality scored 6.75, and 83.49% of the 109 respondents who completed the ranking placed it first. Price reasonableness followed at 5.45, logistics at 3.11, origin traceability at 2.81 and brand awareness at 2.21.

Content preferences point the same way. Respondents wanted real product photographs and videos (73.6%), documentation of growing and breeding practices (68.8%), test reports (67.2%) and price promotions (67.2%). Purchase and logistics information was selected by 41.6% and local culture by 28.0%. Trust is built through evidence of production rather than scenery or folklore.

Offline experience still appeals: 64.0% were willing to join a summer farm visit, although 24.0% were uncertain until details were available. Referral intention is broad but passive. In total, 77.6% would recommend the products, but only 15.2% would do so proactively; 62.4% would recommend only if a friend asked.

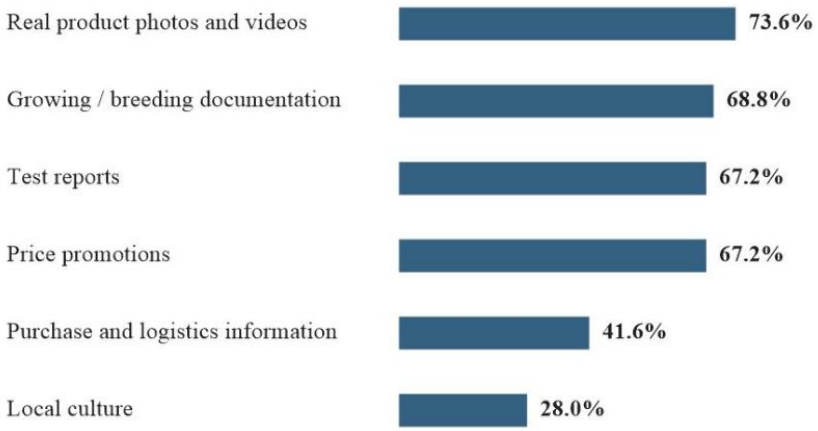


Fig. 5. Preferred promotional content (multiple response).

F. The Conversion Gap

TABLE III SETS THE DEMAND-SIDE PROFILE AGAINST THE VILLAGE'S PERFORMANCE. TWO-THIRDS OF RESPONDENTS WERE WILLING TO BUY, YET ONLINE SALES WERE 2.5% OF REVENUE.

TABLE III. DEMAND-SIDE PROFILE AND VILLAGE-LEVEL OUTCOME

Level	Indicator	Value
Consumer	Never heard of the village's products	44.8%
Consumer	Willing to purchase after information	66.4%
Consumer	Accept fixed pricing	88.0%
Consumer	Prefer e-commerce platforms	50.4%
Consumer	Prefer community group buying	50.4%
Consumer	Prefer livestreaming	26.4%
Consumer	Would recommend proactively	15.2%
Village	Millet sales, 2024 to February 2026	RMB 280,000
Village	Online sales, same period	RMB 6,000-7,000
Village	Online share of revenue	2.5%
Village	Livestream sessions	3 per week
Village	Orders per session	0-60
Village	Exhibition visitors, 2025	about 2,000

Two cautions apply. The consumer and village figures are measured at different levels, individual respondents and cooperative revenue, and should not be read as one sequential funnel. Willingness is also an intention rather than a purchase. Both cautions weaken the demand-side explanation rather than support it: even a heavily discounted intention rate would leave more latent demand than a 2.5% online share can absorb.

G. Supply-Side Constraints

Coding identified five constraints (Table IV). First, the cooperative has no brand certification and no barcode, so its products cannot enter supermarkets, and certification costs money the collective does not have. Second, China Post is the cheapest carrier, but the cooperative reports losing money on every parcel; eggs break and honey leaks, which restricts sales to Beijing, Tianjin and Hebei. Third, the operating team consists of three self-taught staff, scripting is weak, traffic depends on occasional viral videos and orders range from zero to sixty per session. Fourth, millet dominates the product range, eggs cannot be added without a platform deposit and other producers lack online skills. Fifth, Douyin is seen as costly, crowded and strictly regulated, so the cooperative relies on WeChat Channels, whose social reach limits market size.

TABLE IV. SUPPLY-SIDE CONSTRAINTS AND ILLUSTRATIVE EVIDENCE (TRANSLATED FROM INTERVIEWS)

Constraint	Illustrative evidence
Brand and certification	"The packaging has no barcode, so we cannot enter supermarkets. Certification and barcodes both cost money." (Village secretary)
Logistics cost and damage	"China Post is cheapest, but we still lose money on every order." (Village secretary)
Operational capacity	"It is just the few of us, two or three guns. Big streamers have professional teams; we shoot with a phone and edit ourselves." (Village secretary)
Product portfolio	"Selling the same thing every session makes followers tired." (Livestreamer)
Platform lock-in	"Douyin is too competitive and too strictly regulated; WeChat Channels spreads friend to friend." (Cooperative staff)

The constraints reinforce one another. Certification determines whether a product can enter formal retail; logistics determines whether it can leave the village at all; staffing determines whether attention becomes orders; product range determines whether audiences return; platform choice sets the ceiling on reach. A weakness at any point reduces the return on the others. This explains why isolated digital inputs, such as a camera, an account or a training session, produce little revenue.

H. Who Is Reached and Who Buys

One further mismatch concerns the audience. The sample is overwhelmingly young (83.2% aged 18-25), consistent with short-video and campus distribution, yet 79.2% of respondents said that parents or grandparents decide household food purchases. The group reached by digital promotion is not the group that buys. Short video remains the main discovery channel, named by 66.4%, but reach should be treated as an intermediate outcome rather than a sales outcome.

V. DISCUSSION

A. The Binding Constraint

The results point to a supply-side interpretation. Awareness is a barrier, but a single information exposure did not remove it: willingness was 73.9% among respondents with prior familiarity and 57.1% among previously unaware respondents who read the introduction, and the adjusted difference was not significant. Price format, by contrast, was not a barrier, with 88.0% acceptance. What remains is a supply system that cannot serve latent demand. The village has no barcode, loses money on parcels, employs three people, sells one product and depends on a platform chosen for tolerance rather than reach. The problem is not demand generation but conversion capacity.

This reframes the digital dividend debate. Connectivity and platform accounts do not by themselves produce income. The dividend depends on the organizational layer that connects them: certification, packaging, logistics, service and merchandizing. Where that layer is thin, digital attention accumulates without becoming revenue.

B. Implications

Four priorities follow. First, certification and packaging standards should be treated as infrastructure. Brand registration, barcodes and standardized packaging are prerequisites for supermarket entry and platform listing, and they cost less than most digital equipment. Second, logistics should be aggregated rather than subsidized per parcel. Per-shipment subsidies preserve loss-making unit economics; consolidating parcels across villages and products, negotiating volume contracts and scheduling regular dispatch can lower unit costs. Third, channel choice should follow consumer preference rather than operator convenience. Livestreaming can build trust and visibility, but it is not the preferred purchase channel for most consumers. Community group buying and platform stores, each preferred by half the sample, are absent. Fourth, promotion should address the actual purchaser. If parents and grandparents decide household purchases, content and channels should reach them, not only the young users who generate reach.

C. Theoretical Implications

The study extends the buying-funnel logic from consumer psychology to a demand and supply system. In consumer research, the funnel describes individual progression from awareness to purchase [7]. In a village, the funnel is jointly produced by consumer intentions and producer capabilities. Conversion capacity supplies the organizational variable that connects the digital dividend and digital divide literatures. The dividend is conditional on capacity, and the divide is as much organizational as infrastructural.

D. Limitations

The design is a single case with a convenience sample. The sample is young and female-skewed; the information treatment was not randomized; willingness is self-reported; and sales records are administrative. Future work could link individual responses to transaction data, extend the design to several villages and test the conversion-capacity mechanism comparatively.

VI. CONCLUSION

This paper asked why a village with digital infrastructure, a differentiated product and measurable consumer interest still records online sales of 2.5%. The evidence points to the supply side: missing certification, loss-making logistics, thin staffing, a narrow product range and platform dependence jointly limit conversion. A short information exposure was associated with willingness among previously unaware consumers, but it did not close the gap with familiar consumers; conversion capacity remains the binding constraint. For policy, the implication is that digital village programmes should fund the middle layer of certification, packaging, logistics aggregation and operator training before adding further digital endpoints.

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