

Sustainability of Public–Private Partnerships in Agribusiness: Research Instruments, Instrument Validity and Field Evidence from Purvanchal, Uttar Pradesh, India



Kumar Vivek^{1*}, S. Shyam Prasad²

¹Research Scholar, Fellow Programme in Management (FPM), International School of Management Excellence (ISME), Agribusiness Management, ^bChief administrative officer (ICAR), Bangalore, India, 562125, 0009-0001-8095-6592, vivek.icar@gmail.com, <https://orcid.org/0009-0001-8095-6592>.

²PhD, professor and Research Supervisor, International School of Management Excellence (ISME), Marketing, Bangalore, India, 562125, 0000-0003-3710-3858, shyamprasad@isme.in, <https://orcid.org/0000-0003-3710-3858>.

Abstract

Purpose: This paper reports the development, field testing and empirical application of a three-instrument survey set designed to study the sustainability of public–private partnerships (PPPs) in agribusiness in a data-scarce agricultural sub-region. It addresses a gap in the agribusiness partnership literature, where instruments are typically administered to one stakeholder group and measurement properties are seldom reported.

Design/methodology/approach: Three parallel structured interview schedules, built on a shared construct set, were administered face to face to 460 respondents across seven districts and five administrative divisions of Purvanchal: 45 government officials, 65 Farmer Producer Organisations (FPOs) and allied agencies, and 350 farmer members. Analysis comprised rank-order correlation, non-hierarchical cluster analysis, exploratory factor analysis, multivariate analysis of variance and a chi-squared automatic interaction detection (CHAID) classification tree.

Findings: The instruments performed unevenly. Single-item ordinal and binary behavioural measures produced stable and interpretable associations, and the principal perception dimension reached acceptable reliability (McDonald's $\omega = .744$), while two shorter dimensions proved under-sampled. Substantively, administrative engagement was categorically rather than continuously distributed; organisational resource commitment was associated with perceived success only through technology adoption; and farmer participation was distinguished by awareness and perceived opportunity rather than by demographic or landholding characteristics.

Originality/value: The paper contributes a tested multi-stakeholder instrument set, transparent measurement diagnostics rarely reported in this literature, and evidence that the binding constraint on partnership sustainability lies with the intermediary producer organisation.

Keywords: public–private partnerships; agribusiness; research instruments; instrument validity; farmer producer organisations; field survey; Purvanchal; India

1. Introduction

Public–private partnerships have become a standard policy instrument for modernising agricultural value chains in emerging economies. In India they have been applied to cold chains, warehousing, agro-processing, contract farming, digital marketplaces and crop insurance, and they occupy a prominent place in state agricultural strategy. The empirical literature on their performance, however, remains thinner than the policy enthusiasm would suggest, and it is thinner still at the sub-regional level where implementation actually occurs.

Two methodological features of that literature are worth stating at the outset, because they define the contribution of this paper. The first is that studies typically survey one stakeholder group. Research on agribusiness partnerships examines either the public agencies that structure them or the private firms that invest in them, and rather less often the producer

organisations that intermediate them or the farmers who are their intended beneficiaries. Yet misalignment between these groups is the mechanism most frequently blamed for partnership failure. A design confined to a single group cannot detect misalignment, because misalignment is a relation between groups rather than a property of any one of them.

The second feature is that measurement properties are seldom reported. Papers in this area routinely present composite perception scores, factor structures and regression coefficients without reporting sampling adequacy, internal consistency, or the construction rules for composite variables. Where the instruments are purpose-built for a particular region, as they generally must be, the absence of such diagnostics makes it difficult to judge how much weight the findings will bear or to reuse

the instruments elsewhere.

This paper addresses both features directly. It reports the design, field testing and application of three parallel structured interview schedules developed to examine the sustainability of agribusiness partnerships in Purvanchal, the eastern sub-region of Uttar Pradesh. The instruments were built on a shared construct set so that the same underlying dimensions could be observed from three vantage points: the administrators who implement partnership policy, the producer organisations and allied agencies that intermediate partnerships, and the farmers who participate in them. All three were administered face to face by the researcher across seven districts spanning five administrative divisions, yielding 460 completed schedules.

The study setting matters for the instrument design. Purvanchal combines substantial agricultural production with fragmented landholdings, limited processing capacity, weak market integration and constrained private investment. Farmer incomes remain low despite high output, and the region lags the western districts of the same state. Roughly two-thirds of the farmer sample had primary education or less, which rules out self-completed questionnaires and imposes specific requirements on item wording, response format and mode of administration.

The paper makes three contributions. Methodologically, it provides a tested multi-stakeholder instrument set for agribusiness partnership research in data-scarce settings, together with the construct mapping that links each item to the dimension it is intended to observe. Empirically, it reports measurement diagnostics that are rarely published in this literature, including sampling adequacy, factor structure, internal consistency and composite construction rules, and it is candid about where the instruments performed poorly. Substantively, it reports convergent evidence from three stakeholder groups and three analytical techniques indicating that the binding constraint on partnership sustainability lies with the intermediary producer organisation rather than with the regulatory environment or with farmer characteristics.

The paper proceeds as follows. The next section sets out the conceptual grounding and the construct set from which the instruments were derived. The third section describes instrument design and construct mapping. The fourth reports validity and reliability evidence. The fifth describes the field survey and data collection. The sixth sets out the analysis strategy, the seventh the findings, and the eighth interprets them. The paper closes with implications, limitations and directions for further work.

2. Conceptual Grounding and the Construct Set

Partnership Sustainability as a Measurement Problem

Sustainability in the agribusiness partnership literature carries at least four distinct meanings, and instrument design depends on which is intended. Economic sustainability concerns whether the arrangement remains commercially viable and whether farmer incomes improve. Social sustainability concerns inclusion, equitable access and employment. Environmental sustainability concerns resource conservation and climate resilience. Institutional sustainability concerns governance quality, coordination and continuity of the arrangement itself.

These are not alternative labels for one underlying quantity. A partnership may be commercially viable while excluding smallholders, or institutionally well-governed while environmentally indifferent. Instruments that collapse them into a single satisfaction measure cannot detect such divergence, which is one reason aggregate assessments of partnership performance are often uninformative. The instruments reported here therefore treat delivery, policy effectiveness, equity and transparency as separate observable dimensions rather than as components of one scale, and the factor analysis reported below provides empirical support for that separation.

A second measurement problem concerns the unit of observation. Infrastructure partnership research has an obvious unit: the project. Agribusiness partnerships are harder to bound. Production is biological and seasonal, supply is fragmented across many smallholders, and the arrangement typically spans aggregation, processing, logistics and marketing rather than a single asset. Studies therefore tend to observe perceptions of partnership functioning rather than audited project performance. That is a real limitation, and it is one this study shares; it is stated here rather than left implicit.

The Three Perspectives Underlying the Construct Set

The construct set was derived from three established perspectives, each contributing a distinct group of observable dimensions.

Stakeholder theory holds that organisations operate within networks of relationships with groups that affect or are affected by their activity, and that these groups differ in power, legitimacy and urgency (Freeman, 1984; Mitchell et al., 1997). Applied to agribusiness partnerships, it yields constructs concerning alignment, participation, and the perceived fairness of benefit distribution. It also implies that salience is not fixed: government agencies dominate at approval, private investors

during capitalisation, and farmers acquire practical influence only at the operating stage when the arrangement depends on assured supply.

Institutional theory directs attention to the formal rules and informal constraints within which partnerships operate, and to the capacity of the implementing administration (North, 1990; DiMaggio & Powell, 1983). It yields constructs concerning the regulatory environment, administrative familiarity with partnership mechanisms, and the degree of official involvement in partnership implementation.

The resource-based view explains why partnership creates value that the parties could not create separately, locating advantage in resources that are valuable, rare and difficult to imitate, and extending this to alliances formed to access resources that markets supply inefficiently (Barney, 1991; Das & Teng, 2000). It yields constructs concerning resource commitment, complementarity between what each partner seeks and what each contributes, and the absorptive capability required to convert access into use.

Prior instrument practice in this field is worth characterising, because it defines what the present instrument set departs from. Studies of agribusiness partnerships in emerging economies have used three broad approaches. Case-based qualitative designs examine a small number of partnerships in depth through semi-structured interviews and document analysis, producing rich accounts of particular arrangements but little that transfers across settings. Single-group surveys administer one instrument to one category of respondent, typically firms or officials, and report descriptive distributions and bivariate associations. Secondary-data studies work from programme records and published statistics, which are comprehensive where they exist but silent on perception, alignment and organisational capability.

The present authors' own earlier work on this region followed the first of these approaches. Kumar Vivek and Prasad (2024) examined governance and risk mitigation in Purvanchal agribusiness partnerships through structured interviews, focus groups and document analysis, identifying stakeholder alignment, governance clarity and risk-sharing as the conditions distinguishing effective from ineffective arrangements. That study was qualitative and exploratory, and it did not measure those conditions across a sample. The present paper addresses that limitation directly: it develops instruments to observe the same conditions systematically, reports their measurement properties, and applies them to 460 respondents.

Each approach has a characteristic blind spot. Case designs cannot establish whether a pattern generalises. Single-group surveys cannot observe relations between groups. Secondary-data studies cannot observe the variables that the partnership

literature itself identifies as decisive. The instrument set reported here is an attempt to occupy the space between the first two: structured enough to compare across a substantial sample, and administered in parallel to three groups so that cross-group patterns become observable.

Taken together these perspectives specify a construct set at three levels: institutional conditions, stakeholder relations, and organisational resources and capabilities. The instruments were designed so that each level could be observed from each of the three stakeholder vantage points, which is what makes comparison across groups possible.

3. Research Instruments

3.1 Design Principles

Three structured interview schedules were developed, one for each stakeholder group. Four design principles governed their construction.

First, parallel construct coverage. Each schedule observes the same three underlying levels — institutional conditions, stakeholder relations, and organisational resources and capabilities — through items appropriate to the respondent's position. Officials are asked about familiarity with partnership mechanisms and involvement in implementation; organisations about resource commitment and technology adoption; farmers about awareness, participation and perceived benefit. The wording differs; the construct does not.

Second, administration by interview rather than self-completion. In the farmer sample, 51 respondents (14.57%) reported no formal education and 168 (48.00%) only primary education. A self-completed instrument would have generated unreliable responses or non-response from approximately two-thirds of that sample. Face-to-face administration permits clarification of items while preserving a fixed item sequence.

Third, structured rather than open format. The research questions require comparison across 460 respondents and seven districts. Unstructured interviewing would have yielded richer material but nothing systematically comparable. Open-ended probing was retained only for recommendations and priorities, where enumeration of options was not feasible in advance.

Fourth, mixed response formats matched to item type. Perceptual items use five-point Likert scales. Factual and categorical items use response categories developed during an exploratory phase and from departmental documentation. Multiple-response items, such as technologies adopted or outcomes achieved, use binary indicators that were subsequently summed into count variables.

3.2 Development and Exploratory Phase

Instrument development proceeded in four stages over the period preceding the main fieldwork.

The first stage derived an initial item pool from the reviewed literature and from the themes identified in the authors' earlier qualitative study of the same region (Kumar Vivek & Prasad, 2024), which supplied the governance, risk and alignment categories that the structured items were designed to measure. Each construct in the three-level set was expressed as one or more candidate items, with wording adapted from studies conducted in comparable agricultural settings where suitable formulations existed, and drafted afresh where they did not. The second stage added response categories for factual and categorical items. These were taken from departmental documentation, state and central programme reports and partnership agreements, so that categories would correspond to administrative reality rather than to the researcher's expectations. The technology list used in the organisational schedule, for example, reflects the categories appearing in state agricultural technology programmes.

The third stage was an exploratory field phase in which draft schedules were administered to respondents of the kind subsequently surveyed. This phase identified three recurrent problems. Several items used administrative vocabulary that farmer respondents did not recognise, and were rewritten in plainer terms. Several categorical items offered response sets that proved incomplete in the field, and residual categories were added. And a number of items generated near-uniform responses, contributing no variance, and were either reworded or dropped.

The fourth stage finalised item sequence. Items were ordered so that factual and non-sensitive material precedes perceptual and evaluative material, which reduces the risk that early evaluative questions condition later responses. Financial items were placed late in each schedule for the same reason.

Two limitations of this development process should be recorded. The exploratory phase was conducted by the researcher alone, without independent coding of item performance, so judgements about which items to revise rest on a single assessment. And no formal pre-test of the final instruments was conducted on a separate sample, which would have allowed measurement properties to be estimated before rather than after the main fieldwork. As Section 4 shows, prior estimation would have identified the under-sampling of two perceptual dimensions in time to correct it.

3.3 Instrument Structure and Construct Mapping

The officials' schedule comprises 21 question groups. Beyond the profile block it measures familiarity with partnership concepts and functioning; the usefulness of available information sources; belief in

partnership contribution and the areas of greatest impact; attendance at specialised partnership training; level of involvement in partnership initiatives; participation in government partnership programmes; frequency of interaction with partnership stakeholders; perceived constraints across finance, market access, infrastructure, private participation and training; perceived effectiveness of current policy measures for partnership sustainability; replicability of successful models; and support required.

The schedule for FPOs and allied agencies comprises 26 question groups. It measures organisation type, year of establishment, activity areas, geographic scope and turnover; duration of partnership involvement and primary role; the benefits the organisation seeks from partnership and the contributions it makes to it; financing arrangements and the share of organisational budget allocated to partnership activity; financial and market constraints; agricultural inputs supplied and technologies adopted through partnerships; marketing approaches; the perceived regulatory environment; outcomes achieved; risks to continuity; environmental outcomes; sustainability mechanisms; and interest in expanding involvement.

The paired items on sought benefits and offered contributions deserve particular mention, because they operationalise complementarity directly. Asking an organisation both what it wants from a partnership and what it brings to one permits the degree of fit between the two to be observed rather than assumed, which is the empirical content of the resource-based argument in this setting.

The farmers' schedule comprises 24 question groups. It measures the socio-economic and landholding profile; awareness of partnerships and participation in them; areas of participation across finance, market linkage, training, inputs and extension; barriers to participation; ten attitudinal statements on five-point scales; perceived implementation challenges; perceived opportunities; overall assessment of partnership benefit; specific benefits received; socio-economic changes experienced; priorities for future support; and expectations of government and the private sector.

Table 1 sets out the construct mapping, showing how each theoretical level is observed in each schedule. The parallel structure is what permits the three groups to be read against one another even though the analytical techniques applied to each differ.

3.4 Composite Variables and Their Construction

Several analyses use composite variables formed by summing related items. Because composite construction is a frequent and usually undocumented source of ambiguity in this literature, the rules are stated explicitly.

Among the FPO and agency data, technologies

adopted through partnerships is the count of items selected from a five-item list comprising smart irrigation systems, drones and remote sensing, blockchain for supply chain management, climate-resilient crop varieties, and artificial intelligence and data analytics. Perceived partnership success is the count of outcomes selected from a four-item list comprising increased farmer productivity, higher profitability, expansion of market reach, and improved sustainability practices. Both are counts of reported occurrence rather than validated scales, and are interpreted accordingly below.

Among the farmer data, perception of partnerships is the sum of the ten attitudinal items. Perceived challenges is the sum of six items covering limited information, bureaucratic delay, lack of trust, difficulty accessing finance, limited private involvement and inadequate government support. Perceived opportunities is the sum of six items covering increased investment, access to new

technology, strengthened market linkages, improved infrastructure, capacity building and value-chain expansion.

One construction problem is reported here because it affects interpretation. In the dataset as originally prepared, the perceived opportunities composite included two items that also belong to the challenges composite, namely limited private sector involvement and inadequate government support. The two composites therefore share variance by construction, and their observed correlation ($r_s = .852$) is partly an artefact. Recomputing the opportunities composite from the six opportunity items alone changes its correlation with perceived benefits from $r_s = .666$ to $r_s = .656$, which does not alter any substantive conclusion. The issue is reported rather than silently corrected because the overlap affects the multivariate results reported in Section 7.4.

Table 1: Construct Mapping Across the Three Interview Schedules

Theoretical level	Officials (n = 45)	FPOs and agencies (n = 65)	Farmers (n = 350)
Institutional conditions	Familiarity with PPPs; involvement in implementation; perceived policy effectiveness	Perceived regulatory environment; regulatory obstacles	Perceived effectiveness of supporting policies
Stakeholder relations	Frequency of stakeholder interaction; participation in programmes	Benefits sought; contributions offered; risks to continuity	Awareness; participation; perceived equity; transparency of agreements
Resources and capability	Perceived constraints: finance, infrastructure, training	Budget share allocated to PPPs; technologies adopted; perceived success	Perceived opportunities; benefits received; priorities for support

Note. Item wording differs across schedules; the underlying construct does not.

4. Instrument Validity and Reliability

4.1 Content and Construct Validity

Content validity was addressed through three mechanisms. Items were derived from the reviewed literature, so that each maps onto a construct with established theoretical standing. They were supplemented by departmental documentation and state and central programme reports, which supplied the response categories for factual and categorical items. An exploratory field phase preceded finalisation, during which item wording was tested with respondents of the kind subsequently surveyed, and categories that proved unintelligible or incomplete were revised.

Construct validity evidence comes principally from the factor structure of the farmer perception items,

reported in Section 7.3. The nine items resolved into three interpretable components rather than loading indiscriminately, and the components correspond to distinguishable substantive dimensions: benefits and support, policy and implementation, and equity and transparency. The sampling adequacy measure was .636 and Bartlett's test of sphericity was significant, $\chi^2(36) = 317.17$, $p < .001$.

A sampling adequacy value of .636 is above the conventional minimum of .50 but falls in the range usually described as mediocre. The factor structure is therefore treated throughout as a reasonable summary of observed response patterns rather than as an established measurement model, and no claim is made that the three components constitute

validated scales.

4.2 Internal Consistency

Reliability evidence is reported separately for the multi-item dimension and the two short dimensions, because the appropriate coefficient differs between them. The results appear in Table 2.

For the five-item benefits and support dimension, McDonald's omega was .744. Omega rather than coefficient alpha is reported because alpha assumes essential tau-equivalence, that is, that every item contributes equally to the underlying construct. The rotated loadings for this dimension range from .460 to .694, so that assumption is clearly violated, and alpha is known to underestimate reliability under these conditions. Omega relaxes the equal-contribution assumption and is now widely recommended as the default coefficient for congeneric scales. The mean inter-item correlation for this dimension was .212, within the range generally regarded as acceptable for a broad construct.

For the two-item policy and implementation dimension and the two-item equity and transparency dimension, the inter-item correlation is reported instead of a reliability coefficient. For a two-item scale, coefficient alpha reduces algebraically to the Spearman-Brown prophecy formula applied to a single correlation, so it conveys no information beyond that correlation while giving the misleading appearance of a scale reliability estimate. The inter-item correlation was .371 for policy and implementation and .242 for equity and transparency.

No single reliability coefficient is reported across all nine perception items. The factor analysis in Section 7.4 establishes that the items are not unidimensional, and a reliability coefficient computed across a multidimensional item set is not interpretable. The mean inter-item correlation across all nine items was .128, which is itself consistent with multidimensionality rather than with a single underlying construct.

Two conclusions follow, and they bear directly on instrument design rather than merely qualifying the findings.

First, the dimension with an adequate item count performed acceptably. Omega of .744 for the benefits and support dimension is above the conventional threshold and supports its use as a descriptive summary of that construct.

Second, the two short dimensions were under-sampled. An inter-item correlation of .242 between the smallholder equity item and the transparency

item indicates that the two share meaningful but limited variance, which is consistent with the factor solution placing them together while also suggesting that two items are insufficient to represent the construct. A revised instrument would require at least four items for each of these dimensions. This is stated as a specific and actionable finding for subsequent instrument development rather than as a general call for further research.

Consistent with these results, no composite derived from the two short dimensions is used as a dependent variable in any inferential test reported in this paper, and the three-component structure is treated throughout as a descriptive summary of observed response patterns rather than as a validated measurement model.

4.3 What the Instruments Measured Well, and What They Did Not

Taken together, the validity evidence supports a differentiated assessment rather than a single verdict on the instrument set.

Single-item ordinal measures performed well. Familiarity, involvement, perceived policy effectiveness, budget share allocated to partnership activity and the perceived regulatory environment all produced stable distributions across their full response range and yielded interpretable and theoretically coherent associations. These items do not depend on scale construction and are not affected by the internal consistency problem.

Count variables performed adequately but coarsely. The technologies adopted measure, in particular, took only three distinct values across 65 organisations, which limits the precision of any association estimated from it. The direction of the relationships involving this variable is informative; their magnitude should be treated as indicative.

Multi-item perception scales performed unevenly. The benefits and support dimension reached acceptable reliability, while the two short dimensions proved under-sampled. The three-component structure is substantively interpretable and is used in this paper to organise the discussion of farmer perceptions, but it is not presented as a measurement model and no composite derived from it is used as a dependent variable in any inferential test.

Finally, the behavioural items — awareness of partnerships and participation in them — performed best of all, since they record reported behaviour rather than attitude and are not subject to scale construction at all. The strongest finding in this study, reported in Section 7.5, rests on those two items.

Table 2: Reliability Evidence for the Farmer Perception Dimensions (n = 350)

Dimension	Items	Coefficient reported	Value	Mean inter-item r
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Benefits and support	5	McDonald's ω	.744	.212
Policy and implementation	2	Inter-item correlation	.371	—
Equity and transparency	2	Inter-item correlation	.242	—
All perception items	9	Not applicable	—	.128

Note. McDonald's ω is reported for the five-item dimension because the rotated loadings (.460 to .694) violate the essential tau-equivalence assumption underlying coefficient alpha. For two-item dimensions, alpha reduces to the Spearman-Brown formula applied to a single correlation, so the inter-item correlation is reported instead. No single coefficient is reported across all nine items, which the factor analysis shows are not unidimensional.

5. Field Survey and Data Collection

5.1 Study Area and Sampling

Seven districts of eastern Uttar Pradesh were selected: Azamgarh, Barabanki, Jaunpur, Mirzapur, Pratapgarh, Prayagraj and Varanasi. District selection was purposive, on four stated criteria: concentration of Farmer Producer Organisations, presence of agricultural research institutions, degree of agricultural diversification, and observable agribusiness activity.

The districts span five administrative divisions: Prayagraj, Varanasi, Mirzapur, Azamgarh and Ayodhya. This is a deliberate design feature rather than an incidental property of the selection. Partnership implementation in Uttar Pradesh operates through divisional administration, so sampling confined to a single division would have risked mistaking one division's administrative practice for a regional pattern.

Purposive district selection has a cost that should be stated. Because districts were chosen partly for observable agribusiness activity, the sample represents the more active end of the sub-region. Findings describe how partnerships function where they are occurring, and transferability to districts with minimal partnership activity should be established rather than assumed.

Within districts, stratified random sampling was used for producer organisations and their members, with strata constructed to ensure representation across landholding size, degree of agricultural diversification and income group. Stratification was necessary because the study asks whether smallholders benefit equally from partnership arrangements; a sample that under-represented smallholders could not have addressed its own research question. The resulting landholding distribution was 32 respondents below one acre (9.14%), 93 between one and five acres (26.57%), 184 between six and ten acres (52.57%) and 41 above ten acres (11.71%).

Officials were drawn from the departments and

agencies responsible for agriculture, horticulture, marketing and rural development in each district.

5.2 Sample Size and Composition

The farmer sample size follows the Yamane (1967) formula at 95% confidence, $n = N / (1 + Ne^2)$. With a population of approximately 2,800 FPO members across the seven selected districts and a precision level of .05, the formula yields 350.

The official and organisational samples were not derived from this formula. The number of officials holding partnership responsibility, and the number of producer organisations and allied agencies actively engaged in partnerships, are both small within the sampling frame. The realised samples of 45 and 65 approach near-complete enumeration of the accessible population rather than representing a calculated fraction of a large one. This is stated explicitly because applying a precision formula to all three groups retrospectively would misdescribe how the samples were obtained.

The final dataset comprises 460 respondents: 45 government officials, 65 FPOs and allied agencies, and 350 farmer members. The district-wise distribution is given in Table 3. Among the surveyed organisations, 25 (38.46%) were agribusiness companies, 24 (36.92%) farmers' cooperatives and 16 (24.62%) fell into the residual category.

5.3 Data Collection Procedure

All three schedules were administered face to face by the researcher between the exploratory phase and the close of fieldwork. Single-administrator delivery removes between-interviewer variation, which is a meaningful source of error in structured interviewing with respondents of varying literacy, at the cost of extending the fieldwork period.

Participation was voluntary. Name and contact fields were optional on all three schedules, and responses are reported only in aggregate.

Survey data were supplemented by two further

sources. Non-participant observation was conducted during field visits to partnership sites, generating field notes on stakeholder interaction and operating conditions that the structured instruments do not capture. Documentary analysis covered state and central programme reports, policy documents and partnership agreements. These sources were used to contextualise and cross-check survey responses rather than as independent evidence, and no finding

reported below rests on them alone.

One limitation of the structured format should be recorded here, since it bears directly on the principal finding. The instruments contain no items on physical distance to partnership activity, local presence of a functioning producer organisation, or enrolment procedure. As Section 8 explains, this is precisely why the study can identify a group of farmers whose non-participation it cannot explain.

Table 3: District-wise Distribution of the Realised Sample

District	Officials	FPOs and agencies	Farmers	Total
Azamgarh	6	9	53	68
Barabanki	6	9	52	67
Jaunpur	6	10	50	66
Mirzapur	7	9	50	66
Pratapgarh	7	9	51	67
Prayagraj	7	9	51	67
Varanasi	6	10	43	59
Total	45	65	350	460

Note. Seven districts spanning five administrative divisions. Source: primary field survey.

6. Analysis Strategy

Analysis was conducted in SPSS and was deliberately confined to techniques whose outputs are interpretable without specialist statistical training, consistent with the applied orientation of the study. Five techniques were applied, each to a specific question and to a specific stakeholder group.

Rank-order correlation was used for relationships among ordinal perceptual variables. Spearman's coefficient rather than Pearson's is appropriate here because the perceptual measures are five-point Likert items, which are ordinal rather than interval: the distance between adjacent scale points cannot be assumed equal, and Pearson's coefficient requires that assumption. Spearman's coefficient operates on ranks and requires only that responses can be meaningfully ordered. The cost is some statistical power and the inability to characterise the functional form of the relationship.

Non-hierarchical cluster analysis was applied to the officials' data to establish whether engagement with partnerships is distributed continuously or forms discrete groups. The input variables were level of involvement, participation in government partnership programmes and frequency of stakeholder interaction.

Exploratory factor analysis was applied to the nine farmer attitudinal items to establish their underlying structure, using principal components extraction with varimax rotation and Kaiser normalisation,

retaining components with eigenvalues above unity and suppressing loadings below .40.

Multivariate analysis of variance was used to examine the joint association of age and educational level with the farmer perception composites. A multivariate rather than a series of univariate tests was used to avoid inflating the family-wise error rate across five dependent variables.

A chi-squared automatic interaction detection (CHAID) classification tree was used to identify which of ten candidate variables distinguish farmers who had participated in a partnership programme from those who had not. CHAID selects splits using chi-squared tests at each node and imposes no functional form on the relationship, which suits an exploratory question about which variables matter rather than how much.

All relationships reported below are associations observed in cross-sectional data. The study design does not permit inference about the direction of any relationship, and none is claimed.

7. Findings

7.1 Respondent Profile

Officials in the sample held predominantly senior positions: 32 of 45 were directors of their organisation, institution or department, seven were chief executives of agencies and six were accountants.

Partnership responsibility was recent. The majority reported one to three years of partnership-related work, approximately 16% reported four years or more, and approximately 20% reported less than one year. Partnership administration in these districts is a young function staffed largely by officers who acquired the responsibility recently.

Among the 65 organisations, more than half had been established within the preceding five years and 46.15% earlier than that. Partnership engagement was similarly recent, with most reporting one to three years and 22% reporting four to six years. Approximately half allocated between 10% and 25% of organisational budget to partnership activity. Almost all, 63 of 65, expressed interest in expanding partnership involvement.

Farmers in the sample were established cultivators rather than marginal entrants. More than half reported holdings of six to ten acres, more than half practised mixed farming combining crop production with livestock, and approximately 57% reported five to ten years of cultivation experience. Awareness of partnerships was high at 295 of 350, and 269 reported having participated in a partnership programme.

7.2 Administrative Engagement Is Categorically Distributed

Among officials, the three ordinal measures are strongly associated (Table 4). Level of involvement in partnership initiatives and perceived effectiveness of current policy measures correlate at $r_s = .825$. Familiarity with partnership concepts correlates with involvement at $r_s = .689$ and with perceived policy effectiveness at $r_s = .608$. All three are significant at $p < .01$.

Cluster analysis on involvement, programme participation and interaction frequency produced two clearly separated groups, converging after two iterations. One group of 20 officials showed consistently low engagement across all three measures; the second group of 25 showed consistently high engagement. The separation is categorical rather than graduated, and the group means lie near opposite ends of the response range.

The practical implication concerns partnership design rather than administrative theory. Institutional capacity is not evenly distributed within a state administration even where policy is uniform. A partnership whose public counterparts are drawn from the low-engagement group faces a materially different administrative reality from one whose counterparts are drawn from the high-engagement group, within the same state and the same policy framework.

Table 4: Rank-Order Correlations Among Officials' Measures (n = 45)

Measure	Familiarity	Involvement	Policy effectiveness
Familiarity	1.000	.689**	.608**
Involvement	.689**	1.000	.825**
Policy effectiveness	.608**	.825**	1.000

Note. ** $p < .01$ (two-tailed). Spearman rank-order coefficients.

7.3 Resource Commitment Operates Through Technology Adoption

Among producer organisations and allied agencies, three correlations define the central result (Table 5). The share of organisational budget allocated to partnership activity correlates with the number of technologies adopted through partnerships at $r_s = .555$. Technology adoption correlates with perceived partnership success at $r_s = .529$. Both are significant at $p < .01$.

Budget share and perceived success, however, correlate at only $r_s = .214$, which is not significant. If resource commitment alone produced perceived success, this third coefficient would also be substantial. It is not. The association runs through technology adoption rather than directly, which is consistent with the resource-based proposition that

access to resources produces value only where organisational capability converts access into use.

The perceived regulatory environment was not significantly associated with budget allocation ($r_s = .112$), technology adoption ($r_s = -.173$) or perceived success ($r_s = -.037$). This is notable in a literature that routinely identifies regulation as the principal constraint on agribusiness partnerships. For these organisations, the binding constraint appears to have been internal capability rather than external rules.

That conclusion should not be over-generalised. These organisations are young, most with three years or less of partnership engagement, and regulation may become binding at scales they have not yet reached. The defensible reading is that capability binds first and regulation may bind later.

Table 5: Rank-Order Correlations Among Organisational Measures (n = 65)

Measure	Budget share	Technology adoption	Regulatory environment	Perceived success
Budget share	1.000	.555**	.112	.214
Technology adoption	.555**	1.000	-.173	.529**
Regulatory environment	.112	-.173	1.000	-.037
Perceived success	.214	.529**	-.037	1.000

Note. ** $p < .01$ (two-tailed). Spearman rank-order coefficients.

7.4 Reported Constraints and Risks

The constraints reported by each group are consistent with the correlational results and add specificity to them.

Officials identified market linkage strengthening as the leading requirement for promoting agricultural partnerships, cited by more than half the sample, followed by increased financial grant support and improved training programmes, each cited by approximately half. Slightly more than two-fifths considered current policy measures effective in improving partnership sustainability, which is a notably qualified assessment from the group responsible for implementing them.

Organisations reported financial constraints centring on delays in government funding, high implementation cost, unstable financial returns, access to capital and limited private investment. Market constraints centred on poor logistics and infrastructure, inconsistent supply chains, high transport costs, weak demand and limited access to international markets. Risks to partnership continuity centred on market fluctuation, climate

impacts, withdrawal of partners and political instability. Notably, regulatory obstacles were reported less frequently than operational ones, which is consistent with the absence of any significant association involving the perceived regulatory environment.

Farmers reported constraints that were informational and relational rather than technical: limited information and awareness, lack of trust between partners, difficulty accessing financial support, inadequate government support, limited private-sector involvement and bureaucratic delay. Perceived benefits spanned economic and social dimensions, including increased household income, improved food security, better access to education and healthcare, expansion of farming activity and greater social stability.

The pattern across the three groups is internally consistent. Each identifies operational and organisational constraints ahead of regulatory ones, and each locates the difficulty at the point where partnership activity has to be delivered rather than at the point where it is authorised.

Table 6: Rotated Component Matrix for Farmer Perception Items (n = 350)

Item	Component 1	Component 2	Component 3	Communality
Enhances access to inputs and technology	.694			.497
Government involvement is essential	.614			.507
PPPs play a crucial role in agribusiness	.610			.596
PPPs provide better market opportunities	.587	.414		.536
Private sector participation is beneficial	.460			.250
Supporting policies		.784		.630

are effective				
Challenges hinder farmer participation		.734		.551
Smallholders benefit equally			.829	.695
Transparency in agreements is sufficient			.583	.435

Note. Principal components extraction with varimax rotation and Kaiser normalisation. Loadings below .40 suppressed. KMO = .636; Bartlett's $\chi^2(36) = 317.17$, $p < .001$. Total variance explained = 52.17%.

7.5 Farmer Perceptions Resolve into Three Dimensions

Exploratory factor analysis of the nine attitudinal items produced three components with eigenvalues above unity, accounting for 52.17% of total variance (20.04%, 17.12% and 15.02% after rotation). Communalities ranged from .250 to .695. The rotated structure appears in Table 6.

The first component groups items concerning benefits and support: enhanced access to inputs and technology (.694), the necessity of government involvement (.614), the role of partnerships in improving agribusiness (.610), improved market opportunities (.587) and the value of private-sector participation (.460). The second groups items concerning policy and implementation: effectiveness of supporting policies (.784) and implementation obstacles to participation (.734), with market opportunities cross-loading at .414. The third groups items concerning equity and transparency: equitable benefit for smallholders (.829) and sufficiency of transparency in agreements (.583).

The structure is substantively informative. The item on equitable benefit for smallholders loads with transparency rather than with the implementation items, which indicates that respondents evaluate fairness of distribution together with openness of agreements, and separately from whether partnerships deliver anything at all. A respondent can therefore regard partnerships as beneficial in

principle while regarding their distribution as inequitable. These are distinct judgements rather than a contradiction, and an aggregate satisfaction measure would conceal the distinction.

Multivariate analysis of variance examined the joint association of age and educational level with the five perception composites. Age, educational level and their interaction were each significantly associated with the combined dependent variables (Pillai's trace = .112, .123 and .219 respectively), with small effect sizes ranging from .028 to .044. At the level of individual measures, age was associated with general perception (partial $\eta^2 = .055$, $p = .001$), educational level with awareness and participation (partial $\eta^2 = .043$, $p = .002$) and with perceived challenges (partial $\eta^2 = .024$, $p = .046$), and the interaction with perceived benefits (partial $\eta^2 = .076$, $p = .001$).

Box's test indicated unequal covariance matrices ($M = 482.648$) and Levene's test indicated unequal error variances for most dependent variables. Pillai's trace was used as the multivariate test statistic because it is the most robust of the available statistics under these conditions, but the results are interpreted with corresponding caution. Two of the five dependent variables are the composites affected by the overlap problem described in Section 3.3, which is a further reason for caution. The substantive reading is that background characteristics condition farmer engagement without determining it: effect sizes are uniformly small.

Table 7: Awareness and Participation in Partnership Programmes (n = 350)

	Participated	Did not participate	Total
Aware of PPPs	269	26	295
Not aware of PPPs	0	55	55
Total	269	81	350

Note. No farmer unaware of partnerships had participated. Source: primary field survey.

7.6 Participation Is Distinguished by Access, Not by Farmer Characteristics

The classification analysis produced the clearest

result in the study. Of ten candidate variables entered, only two were retained: awareness and participation in partnerships, and perceived opportunity level. Age,

gender, educational level, farm size, type of farming, general perception, perceived challenges and perceived benefits added nothing further. The resulting tree had six nodes, four terminal nodes and a depth of two, with a risk estimate of .086 (SE = .015).

The underlying cross-tabulation is more informative than the tree and is reported in Table 7. Of the 55 farmers unaware of partnerships, none had participated. Awareness operates as a necessary condition. Of the 295 aware farmers, 269 had participated and 26 had not.

Those 26 respondents are the analytically interesting cases. They are aware of partnerships, their perceived opportunity scores are not distinguishable from those of participants, and yet they have not participated. No measured variable separates them from participants, because the variables that would do so were not measured.

Two further results are consistent with this reading. Perceived opportunities and perceived benefits are strongly associated ($r_s = .666$, $p < .001$), as are perceived challenges and perceived benefits ($r_s = .655$, $p < .001$). The second of these is counter-intuitive and is interpreted in Section 8. Farmer priorities for future support were led by access to credit and finance, identified as the highest priority by approximately 60% of respondents, followed by extension and training, agricultural technology, and policy and regulatory support.

8. Interpretation and Discussion

Three features of these results warrant interpretation: what they indicate about partnership sustainability, what they indicate about the instruments that produced them, and where the two interact.

The substantive findings converge. Among officials, engagement is concentrated in a subset of the administration rather than distributed across it. Among producer organisations, resource commitment is associated with perceived success only through technology adoption, while the regulatory environment is associated with nothing. Among farmers, participation is distinguished by awareness and perceived opportunity rather than by demographic or landholding characteristics. Three stakeholder groups, three analytical techniques, and three independent routes to the same place: the binding constraint on partnership functioning sits with the intermediary organisation through which partnerships operate.

This has a specific implication for how agribusiness partnerships should be conceptualised. In conventional infrastructure partnership research the arrangement is dyadic: a public authority and a private concessionaire, with users as beneficiaries.

The evidence here indicates that agribusiness partnerships of this type are triadic. Neither the public agency nor the private firm can reach dispersed smallholders without an intermediary, and the intermediary's capability determines whether the other two can transact at all. Treating producer organisations as beneficiaries, which is common in programme documentation, therefore misdescribes their function and systematically under-provides for the capability on which the arrangement depends.

The counter-intuitive association between perceived challenges and perceived benefits requires comment, since it would otherwise invite misreading. It should not be interpreted as challenges producing benefits. The plausible mechanism is exposure: farmers actively engaged with partnership programmes encounter both their advantages and their difficulties at first hand and can report on both, whereas farmers with no involvement report neither. The association reflects the structure of who is in a position to answer, not a causal relationship.

The methodological contribution of the study can now be stated more precisely. Multi-stakeholder parallel instrumentation is uncommon in this literature, and its value here is demonstrable rather than asserted: the convergent result could not have been obtained from any one of the three instruments alone. Each group's evidence is individually modest. Forty-five officials support descriptive and simple relational analysis and no more. Sixty-five organisations yield correlations on coarse measures. Three hundred and fifty farmers support richer analysis but speak only to the demand side. What gives the overall result its weight is that three independent measurements, using three different techniques on three different populations, arrive at the same location.

This is a general point about design economy in data-scarce settings. Where no single instrument can be administered at a scale sufficient for strong inference, parallel instrumentation across groups can substitute breadth of corroboration for depth within any one group. The cost, equally, is real: no group is studied deeply enough to characterise mechanisms, which is why this study reports what the constraint is and not how it operates.

Turning to the instruments, the measurement results carry a lesson that is directly useful for subsequent research in this area. The study's most robust finding rests on its simplest items. Awareness and participation are binary behavioural measures requiring no scale construction, and the cross-tabulation they produce is both unambiguous and consequential. The study's weakest measurement properties attach to its most elaborate instrument component, the nine-item perception battery, where two of three dimensions are under-sampled and internal consistency falls well below conventional thresholds.

The implication is not that perceptual measurement should be abandoned, but that item allocation deserves more attention than it usually receives at the design stage. This study would have been stronger had it allocated four or more items to each of the equity and transparency and the policy and implementation dimensions, and had it avoided composite definitions that share items across constructs. Both recommendations are specific enough to act on.

The interaction between the substantive and measurement findings appears most clearly in the case of the 26 aware non-participants. The classification analysis can establish that no measured variable distinguishes them; it cannot establish what does. Because aggregation in this setting runs through producer organisations, and because those organisations are unevenly distributed and mostly young, the likeliest explanation is organisational access rather than farmer disposition: physical distance from partnership activity, absence of a functioning organisation locally, or exclusion at the point of enrolment. The instrument contained no items on any of these, which is why the finding takes the form of a well-specified question rather than an answer.

This recasts the standard account of low smallholder participation. That account attributes non-participation to awareness deficits and prescribes information campaigns. For the group identified here, awareness and perceived opportunity are already present. What is absent is access. The sampling frame strengthens rather than weakens this reading: all 350 farmers are members of producer organisations, so the 26 are already inside the organisational system and nonetheless excluded from partnership programmes. If access fails for organised farmers, it is unlikely to succeed for unorganised ones. The study observes the lower bound of the exclusion problem.

9. Conclusions, Implications and Limitations

9.1 Conclusions

This paper set out to report the development, validation and application of a three-instrument survey set for studying the sustainability of agribusiness partnerships in a data-scarce agricultural sub-region, and to report what that instrument set found.

On the instruments, the assessment is differentiated. Single-item ordinal measures and binary behavioural items performed well and support the principal findings. Count variables performed adequately but coarsely. Within the perception battery, the five-item dimension reached acceptable reliability ($\omega = .744$) while the two two-item dimensions were under-sampled; the battery is therefore used descriptively rather than inferentially throughout. The parallel

three-group design worked as intended: it permitted the same constructs to be observed from three vantage points and made a cross-group pattern visible that no single-group design could have detected.

On partnership sustainability, the evidence indicates that performance in a region of this type depends less on the regulatory environment or on farmer characteristics than on the capability and reach of the producer organisations through which partnerships must operate. Administrative engagement is concentrated rather than distributed; organisational resources convert into perceived success only through technology adoption; and farmer participation turns on access rather than disposition.

9.2 Implications

For programme design, the implication is that partnership initiatives should be assessed on intermediary capability developed rather than on projects signed, and that capability building in producer organisations should be budgeted as a direct input to performance rather than treated as an ancillary activity. Where the objective is smallholder inclusion, extending functioning intermediaries into unserved areas is likely to yield more participation than further awareness activity among farmers who are already aware.

For monitoring, the factor structure indicates that delivery, policy effectiveness, and equity and transparency are evaluated independently by farmers and should therefore be monitored separately. Divergence between them is an early indicator of stress in a partnership that aggregate satisfaction measurement would not reveal.

For partnership structuring, the finding that stakeholder salience shifts across the project life cycle carries a sequencing implication. Government agencies hold decisive influence at appraisal and approval, private investors during capitalisation, and farmers acquire practical influence only at the operating stage, when the arrangement depends on assured supply. The party whose influence rises latest is also the party least able to renegotiate once assets are committed. Procurement terms, price mechanisms and grievance procedures should therefore be settled while the private partner retains negotiating latitude, which in practice means before rather than after capital commitment.

For risk allocation, the evidence supports assigning risks to the actor best positioned to manage them rather than transferring the maximum feasible share away from the public party. In agricultural partnerships the actor with least bargaining power is typically the producer, so default transfer is both inefficient, because producers cannot manage market or policy risk, and inequitable.

For research practice, the paper offers a tested instrument set, an explicit construct mapping, and a

record of which components bore weight and which did not. Subsequent studies adapting these instruments should allocate at least four items per perceptual dimension and should avoid composite definitions that share items across constructs.

9.3 Limitations

Five limitations qualify these findings, and their directions differ.

The design is cross-sectional, so all reported relationships are associations and the direction of none can be established. This weakens all causal claims equally.

The study relies on stakeholder perception rather than audited partnership performance, which was not available at district level. Perceived success is not verified success, and the bias could operate in either direction.

Two of the three perception dimensions are represented by only two items each and are therefore under-sampled, which is why no composite derived from them carries inferential weight in this paper.

District selection was purposive on criteria including observable agribusiness activity, so the sample represents the more active end of the sub-region. This direction is informative: if intermediary capability binds where partnership activity is concentrated, it is likely to bind more severely where activity is sparse.

The farmer sampling frame is confined to members of producer organisations, so farmers outside the organisational system are unrepresented. As argued in Section 8, this bounds the exclusion finding from below rather than calling it into question.

9.4 Further Research

Four directions follow from specific limitations rather than from general aspiration. Each is specified at the level of a design rather than a topic, so that it can be acted on directly.

Longitudinal tracking of partnerships from approval through operation would resolve the direction of the association between administrative involvement and policy perception, and would establish whether early perceived success predicts realised performance.

An instrument designed to capture access conditions — distance, local organisational presence, enrolment procedure — administered to the non-participating group identified here would test the organisational-access explanation advanced in Section 8. This is the most direct extension of the present study.

Development and validation of a measurement instrument for farmer perceptions of agribusiness partnerships, with at least four items per dimension, would address the under-sampling identified in Section 4 and would permit the three-dimensional structure reported here to be tested confirmatorily rather than explored.

Comparative application of the instrument set across states with differing institutional capacity would establish whether capability binds before regulation more generally, or whether this ordering is specific to the setting studied here. Because the instruments and construct mapping are reported in full above, such replication requires no further instrument development.

A fifth direction is worth noting even though it does not follow from a limitation of this study. The organisational data contain paired measures of what each organisation seeks from partnership and what it contributes to one. This study used them descriptively. A study with a larger organisational sample could use the same pairing to construct a direct index of complementarity between partners, which would permit the resource-based proposition to be tested rather than inferred. Doing so would require an organisational sample several times the size achieved here, which is feasible at state rather than sub-regional scale.

Author Note

Kumar Vivek is a Fellow Programme in Management (FPM) research scholar at the International School of Management Excellence (ISME), Bangalore, India. S. Shyam Prasad, PhD, is Research Supervisor at the same institution. This paper draws on primary survey data collected by the first author in seven districts of Purvanchal, Uttar Pradesh.

Author contributions (CRediT)

Kumar Vivek: Conceptualisation; Methodology; Investigation; Data curation; Formal analysis; Writing – original draft; Visualisation; Project administration.

S. Shyam Prasad: Conceptualisation; Methodology; Validation; Supervision; Writing – review and editing.

Relationship to the authors' prior work

This paper forms part of a programme of research on public-private partnerships in agribusiness in Purvanchal, Uttar Pradesh, conducted by the first author under the supervision of the second, and it draws on the first author's doctoral research at ISME Bangalore.

An earlier paper by the same authors, Kumar Vivek and Prasad (2024), reported a qualitative, case-based study of governance and risk mitigation in agribusiness partnerships in the same region, based on structured interviews, focus groups and document analysis. That study is cited in the present paper and informed the development of the instruments reported here.

The present paper is distinct from that earlier work in design, data and contribution. The earlier study was qualitative and did not administer a survey instrument; the present paper reports the

development and field testing of three structured instruments, their measurement properties, and quantitative findings from 460 respondents. The contextual framing of the research problem and the theoretical grounding in stakeholder theory, institutional theory and the resource-based view are necessarily shared across the two papers, and some overlap of wording in those sections is therefore to be expected. All empirical material, instrument documentation, analysis and findings reported here are new and have not been published elsewhere.

The manuscript is not under consideration by any other journal.

Ethics

All participants were informed of the purpose of the research before the interview and participation was entirely voluntary. Name and contact fields were optional on all three interview schedules. No incentive was offered. Responses are reported only in aggregate, and no individual respondent or organisation is identifiable from any result presented in this paper.

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Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data supporting the findings of this study are available from the corresponding author on reasonable request.

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