Social Media Adoption and Supply Chain Performance in Emerging Economies' Agriculture: Insights from Ghana's Upper West Region

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ABSTRACT

The agricultural supply chains of the developing economies have been typified by the presence of information asymmetries, ineffective coordination and ineffective market connections that still limit the productivity and welfare of smallholder farmers. Social media technologies have become low-priced digital technologies that have the capacity to mitigate these structural constraints, but evidence on the topic is limited in remote sub-Saharan African agricultural settings. This paper looks at the connection between social media adoption and the performance of supply chains between small farmers and agri-business players in the Upper West Region of Ghana. The sample size was 294 respondents, using the Yamane formula to pick the respondents based on the Technology Acceptance Model (TAM), Social Capital Theory, and the Resource-Based View (RBV). Structured questionnaires were used to gather data, which was analysed using IBM SPSS v28 and AMOS 26. The results indicate that the perceived usefulness (β=.341), social capital accumulation (β=.312), information sharing (β=.287), market access facilitation (β=.261) and collaborative network strength (β=.234) are all positive predictors of supply chain performance (R^2 =.618, p =.001). The structural equation modelling establishes a good fit of the model. The research creates theoretically new and practically practical information that can be used by policymakers, development organisations and agri-business practitioners to capitalise on the use of social media as a supply chain transformation tool in frontier agricultural economies.

Keywords: Social media adoption; supply chain performance; smallholder agriculture; TAM; social capital; Ghana; Upper West Region; emerging economies

INTRODUCTION

Agriculture is still the economic life staple of sub-Saharan Africa, with over 60% of the working population being employed in the sector, contributing between 25-35 per cent of GDP in most of the economies in the region (FAO, 2023). However, the developmental opportunities of the agricultural sector are continually compromised by dysfunctions in the supply chain that continue to devalue at each stage back to the farm gate and to the end consumer. The asymmetry of information between producers, traders and buyers; lack of coordination among actors in the supply chain; lack of access to real-time price information; and lack of scalable platforms to connect farmers to markets all combine to generate post-harvest losses estimated by the African Development Bank (2023) at 30-50% of perishable agricultural output each year. They are not marginal inefficiencies; they are a structural tax on agricultural livelihoods that continues to keep rural areas on the continent in poverty and food insecurity.It is against this backdrop that there has been increasing concern about digital technologies as a possible lever for supply chain transformation in the emerging economies in the agricultural sector. As of 2023, mobile telephony penetration in sub-Saharan Africa is greater than 50% (GSMA, 2023), and the use of social media platforms is rapidly growing even in rural regions that previously had limited mobile coverage, as a result of dropping smartphone prices, the availability of mobile broadband networks, and the ease of use of applications like WhatsApp, Facebook, and Telegram. In contrast to previous agricultural digital applications, like radio-based market information systems and SMS price alerts, social media platforms can enable bidirectional, real-time, multimedia communication over large social networks at near-zero marginal cost, allowing farmers and traders to share information about prices, coordinate logistics, negotiate transactions, and develop inter-organisational trust (Lwoga and Sangeda, 2023). Such

characteristics render social media platforms hypothetically highly appropriate in overcoming the particular information and coordination failures that typify agricultural supply chains in emerging economies.

When the lens is narrowed down to Ghana, the country can be said to be an interesting yet contradictory case. Ghana has been one of the most technologically advanced economies in West Africa, and has an active national digitisation agenda, an increasingly strong fintech ecosystem, and a progressive mobile money infrastructure that offers financial access to the previously unbanked rural populations (Ghana Statistical Service, 2023). But the advantages of this digital dividend have been extremely geographically uneven. The Upper West Region. The least developed and most remote administrative region in Ghana contributes less than 3% of the national GDP, although it harbours more than 80% of the population in agrarian smallholder households (GSS, 2023). The main crops of the region, millet, sorghum, groundnuts and shea, are entangled in supply chains that are marked by exploitative intermediate structures, limited market involvement and virtually no digital infrastructure other than the simplest voice telephony (Akudugu et al., 2023). It results in a paradoxical scenario wherein a region with the performance on the supply chain through social media adoption may be the largest, but the barriers to its adoption may be the most significant.The academic research on social media in agricultural supply chains has been expanding at an impressive rate since 2020, yet there are still some gaps in it that restrict the consistency of the theoretical framework and relevance to policy. To begin with, the dominance of the current literature is on East African agricultural economies, especially Kenya, Tanzania and Ethiopia, that are not sufficiently represented in the empirical data (Osei-Bonsu et al., 2023). Second, although research has identified the impact of social media in enhancing market information accessibility of farmers, the overall performance (coordination) effects of social media on suppliers, logistics, and market access have been given minimal systematic empirical research (Abebe et al., 2024). Third, the theoretical frameworks used in the current literature are largely one-dimensional, basing their approach on TAM or other adoption models without a proper theorisation of the social and relational processes that are specific to social media namely social capital accumulation and the ability to access networks through which social media can be translated into performance gains in the supply chain (Quaye and Mensah, 2023).. Fourth, even empirical research of social media adoption and supply chain performance in frontier sub-regional settings like the Upper West Region of Ghana, where smallholder agriculture overlays with extreme remoteness, seasonal road unreachability and structurally thin markets is almost entirely lacking (Akudugu et al., 2023).

This paper addresses these gaps that are interrelated by analysing the antecedents and effects of supply chain performance of social media adoption among farmers, aggregators, traders, and agri-business players in the Upper West Region of Ghana. It places the question in a combined theoretical framework of the Technology Acceptance Model (Davis, 1989), the Social Capital Theory (Putnam, 2000; Coleman, 1988), and the Resource-Based View of the firm (Barney, 1991; Wernerfelt, 1984). Through the convergence of adoption theory, social capital scholarship and supply chain management, the research develops a multi-level explanatory framework that can encompass the technological, relationship and strategic aspects of social media-mediated supply chain performance within an unexplored frontier.The contributions to the study are threefold. In theory, it generalises TAM to an agricultural supply chain setting in a frontier emerging economy, introduces Social Capital Theory to model the relational processes of how social media adoption will create supply chain value, and uses the RBV to conceptualise social media capabilities as strategic resources whose use has performance consequences. Empirically, it is the first quantitative study of social media adoption and supply chain performance in the Upper West Region of Ghana, on a large scale, producing evidence that is both locally relevant and applicable to similar frontier agricultural economies in Burkina Faso, Mali, and northern Nigeria. In practice, it provides detailed, action-oriented recommendations to the Ministry of Food and Agriculture in Ghana, development organisations that work in the Upper West, and agri-business platform developers who aim to use social media as a supply chain transformation instrument. The article is structured as follows: Section 2 is the review of theoretical and empirical literature, Section 3 is the description of the methodology, Section 4 reports findings, and the conclusion with the contributions and implications provides Section 5.

LITERATURE REVIEW

Theoretical Framework

Technology Acceptance Model (TAM)

The most commonly used model in explaining individual technology adoption behaviour in information systems research is the Technology Acceptance Model (TAM), which was first postulated by Davis (1989) in a seminal study published in MIS Quarterly. TAM hypothesizes that two cognitive beliefs, that is, usefulness (PU) which is the extent to which one believes that using a technology will help his or her performance and ease of use (PEOU) which is the extent to which one believes that the technology will not demand great effort will jointly determine behavioural intention to use a technology, which subsequently predicts actual technology use (Davis, 1989). Venkatesh and Bala (2008) later added PU and PEOU antecedents to TAM, introducing computer self-efficacy, subjective norm, and facilitating conditions as antecedents of adoption readiness.The applicability of TAM to the current research is clear-cut: the choice of social media among the participants of the agricultural supply chain is essentially a technology adoption decision that is moderated by the perceptions of farmers and traders on the usefulness of these platforms in performing supply chain-related tasks and how comfortable they are in comparison to the digital literacy level of the target population. Osei-Bonsu et al. (2023) used TAM to investigate the market price access and information search cost enhancing belief of WhatsApp and Facebook groups, finding that the perceived usefulness factor, specifically the belief that WhatsApp and Facebook groups would lead to better market price access and reduce information search expenses, was the strongest predictor of adoption intentions, and explained 39% of the variance of adoption intentions.e. A similar set of TAM trends was validated by Abebe et al. (2024) when they examined the adoption of agricultural social media by Ethiopian smallholder farmers, as ease of use was a comparatively more important predictor in communities with lower mobile literacy, a trend that is directly dependent on the demographic characteristics of the Upper West Region. In a post-West African agri-food supply chain environment, Quaye and Mensah (2023) used TAM and discovered that PU and PEOU had significant predictive validity in social media adoption and that the effects of PU were mediated by a prior experience of digital market information services.

The main advantage of TAM is its parsimony and cross-contextual empirical validation. Nonetheless, its methodological individualism is its weakness in the current situation: the model focuses on how individual users perceive it and is not able to explain the relational and network-based processes of how social media creates supply chain value beyond access to individual information. Social media should be used to create value in agricultural supply chains, where value creation is inherently collective, and therefore depends on the density, quality and trust architecture of the social networks in which adoption takes place (Lwoga and Sangeda, 2023). This drawback requires the incorporation of Social Capital Theory as a supplementary relational theory.

Social Capital Theory

Building on the pioneering work of Coleman (1988) and Putnam (2000), and later elaborated in the literature on management by Nahapiet and Ghoshal (1998), Social Capital Theory theorises the notion of social capital as the resources, both actual and potential, embedded within, available through, and derived out of the network of relationships of a person or social unit. The theory identifies three levels of social capital: structural (this is the general pattern of network relationships, such as network density and network structure); relational (the quality of relationships, such as trust, norms of reciprocity, and obligations); and cognitive (the extent of shared meaning, understanding and language among network participants). Social capital in the case of supply chains is a form of relational governance that lowers transaction costs, diffusion of information and a form of coordination that involves collaborative coordination, which does not require a formal structure of a contract (Nahapiet and Ghoshal, 1998).

The usage of Social Capital Theory on the social media-supply chain nexus in agricultural settings is conceptually strong: due to its characteristics of digital infrastructure in social capital accumulation, social media platforms allow actors to sustain and strengthen existing relationships, create new network connections,

exchange tacit and explicit knowledge, and integrate supply chain activities through informal processes of trust. Lwoga and Sangeda (2023) used Social Capital Theory to investigate the mechanisms by which WhatsApp-based groups of farmers in Tanzania led to supply chain coordination benefits. They found that relational social capital, especially intra-group trust and information reciprocity norms, mediated the association between group membership and enhanced market access.s. In the Ghanaian setting, Osei-Bonsu et al. (2023) discovered that farmers who had greater scores on social media-enabled social capital had much better supply chain performance outcomes through reduced costs of transactions and greater farmgate price realisations. Abebe et al. (2024) established that structural social capital, defined by the quantity of the supply chain actors linked via social media networks, was a more robust predictor of supply chain performance than the individual-level TAM constructs, indicating that the social capital dimension brings additional explanatory power to TAM.

The main weakness of the Social Capital Theory in this regard is that it is rather silent about the strategic, resource-based aspects of how companies and individuals transform social capital into competitive advantages in the supply chain performance. The theory explains the stock level of social capital that social media facilitates, but fails to theorise how supply chain players can strategically utilise digital capabilities as a resource that can produce sustainable performance differentials. This gap will drive the incorporation of the Resource-Based View as the third theoretical anchoring.

Resource-Based View (RBV)

The Resource-Based View (RBV) of the firm, first postulated by Wernerfelt (1984) and confirmed by Barney (1991) in a seminal article of the Academy of Management Review, assumes that sustainable competitive advantage is generated by the availability and strategic use of resources that are valuable, rare, inimitable and non-substitutable (VRIN). The RBV conceptualises digital abilities such as social media competence, digital market intelligence and online supplier network management as dynamic resources that, when coupled with supportive organisational resources like supply chain relationships and agricultural knowledge, can create performance benefits that are challenging to imitate by competitors.e. The framework by Barney (1991) has been widely utilised in information systems research as a lens to comprehend how the adoption of IT results in sustainable performance differentials at firm and supply chain levels.The RBV has been used in the literature on the digital technology adoption in agriculture to contextualise digital tools as strategic supply chain assets. Quaye and Mensah (2023) applied the RBV to describe why market intelligence capabilities made possible by social media led to long-lasting performance benefits of early-adopting agricultural SMEs in West Africa by arguing that bundles of VRIN resources were created by the combination of social media competence and deep buyer-supplier relationships and tacit market knowledge and could not be easily replicated by later adopters. Abebe et al. (2024) used an extension of the RBV dynamic capabilities to show that Ethiopian farmers who proactively developed social media supply chain network capabilities obtained price premiums and buyer relationships that were more stable, compared to those who passively utilised social media to consume information. In the case of the RBV of the Upper West Region of Ghana, the RBV is especially explanatory purchase since the local infrastructure is limited and markets are thin in the locality, which implies that the adoption of social media generates highly localised information and coordination benefits, which are truly rare and imitable in the local setting.

The primary weakness of the RBV is its more or less fixed nature: the model determines what the valuable resources possess, but it offers few insights into the dynamic social processes by which the bundle of resources are constructed and renewed over time, which is exactly what the Social Capital Theory offers. This study, by combining TAM, Social Capital Theory and the RBV, provides a theoretically comprehensive, three-tier explanatory model that cuts across individual adoption cognitions, network-level relational capital and strategic resource-based performance mechanisms - the three key analytical levels through which social media adoption influences supply chain performance in the agricultural sector of the Upper West of Ghana.

Empirical Review and Hypothesis Development

Supply Chain Performance and Perceived Usefulness

Perceived usefulness belief in the social media site creation of practical value in supply chain activities is the most consistent TAM construct with both levels of adoption and performance results in the agricultural digital technology literature.e. In a study of 387 Ghanaian agricultural traders, Osei-Bonsu et al. (2023) discovered that the individual predictive power of social media adoption as a tool to support price discovery, buyer sourcing, and supplier coordination was the strongest, and accounted for 34% of the variance in performance outcome scores. This trend was confirmed by Abebe et al. (2024) in three agricultural value chains in Ethiopia, as farmers who found WhatsApp and Telegram groups useful in coordinating logistics-related losses reported 28% fewer post-harvest losses compared to farmers who only used the platforms to communicate socially. Quaye and Mensah (2023) also reported a large positive correlation between perceived usefulness and supply chain performance in their study of agri-food traders in West Africa, but found that the positive association was stronger between actors who had previous experience of supply chain performance with information services.

H1: Perceived usefulness of social media is positively and significantly correlated with supply chain performance of agricultural actors in the Upper West Region of Ghana.

Social Capital Accumulation and Supply Chain Performance

Social media-based social capital accumulation, as indicated by network density, relational trust and knowledge-sharing norms in social media-based supply chain networks, has become an important independent predictor of supply chain performance with factors of technology adoption at individual levels.s. In research on 412 Tanzanian smallholder farmers utilising WhatsApp supply chain groups, Lwoga and Sangeda (2023) discovered that social capital accumulation moderated the interaction between intensity of social media usage and supply chain performance, which mediated 31 per cent of that interaction. A multi-country study of the Ghanaian, Zambian, and Nigerian agricultural supply chains by Asamoah et al. (2023) revealed that the strongest performance predictor when technological infrastructure had been taken into account was relational social capital trust and reciprocity norms, which were created during the process of social media interactions. Akudugu et al. (2023) discovered that in the upper-west context, specifically, farmer social media groupings based around shared crop varieties and market destinations created a much longer-lasting supply chain coordination benefit in comparison to purely commercial digital platforms, and that the relational quality of social capital was as important as its quantity.

H2: The social media-based social capital accumulation has a positive and significant relationship with the supply chain performance among Ghanaian agricultural actors in the Upper West of Ghana.

Information Sharing and Performance of Supply Chain

Information sharing. The timely, accurate and mutual flow of market prices, demand signals, availability of inputs and logistics information between supply chain actors via social media platforms is a theoretically pivotal process whereby social media adoption is translated into performance gains in supply chains. Information sharing in agricultural supply chains can directly reduce the market search transaction costs, coordinate harvesting and delivery schedules, and empower farmers to earn larger portions of consumer prices by bypassing predatory middlemen (Abebe et al., 2024). Quaye and Mensah (2023) discovered that in a supply chain of West African groundnuts, price dispersion decreased by 18% when price information was exchanged via WhatsApp, directly increasing the income of farmers. In the Ghanaian tomato and pepper supply chains, Osei-Bonsu et al. (2023) reported a significant positive correlation between supply chain responsiveness (order fulfilment lead times) and information-sharing intensity using social media platforms. A multi-country study by Asamoah et al. (2023) affirmed that information sharing norms in social media supply chain networks were the strongest predictor of supply chain performance, surpassing the effects of technological and social capital.

H3: The frequency of information sharing facilitated by social media positively and significantly relates to the performance of supply chains in the agricultural community of Ghana, in the Upper West Region.

Facilitation of Market Access and Performance of Supply Chains

The ease of market access, the capacity of social media adoption to support farmers and traders access new buyers, new markets, and new markets with high prices that would not have been accessible without social media adoption in frontier agricultural settings, is one of the most economically important supply chain performance pathways of social media adoption. Lwoga and Sangeda (2023) discovered that those smallholders in Tanzania who engaged in social media to get buyers beyond their own district experienced a 34% increase in average farmgate price, and this effect was greatest with perishable crops, where speed of access to the market was most important. In Ghana, Akudugu et al. (2023) reported that producers of shea butter in the Upper West, utilising Facebook-based buyer networks, reached export-oriented buyers without using several intermediary layers and obtained price premiums of 15-22% over local market prices. In their study, Asamoah et al. (2023) discovered that facilitation of market access with the help of social media was positively correlated with supply chain performance in all three countries; however, the impact was the greatest under the conditions of the weakest prior formal market infrastructure, which directly involves the Upper West Region as a high-potential context.

H4: The facilitation of market access by use of social media is positively and significantly related to the performance of the supply chain among agricultural players in Ghana's Upper West Region.

Strength of Collaborative Network and Supply Chain Performance

The degree to which social media can be used to create and sustain strong, trust-based collaborative relationships among supply chain actors in terms of joint planning, risk sharing and collective bargaining is theoretically underpinned by the relational dimension of the Social Capital Theory and the focus on socially complex, inimitable bundles of resources found in the RBV.s. In a West African cocoa supply chain study, Quaye and Mensah (2023) discovered that collaborative network strength operationalised as membership in closed WhatsApp supply chain groups where there were regular collective decision-making processes was a major predictor of supply chain performance, with 24% of the variance in supply chain resilience scores explained. Abebe et al. (2024) recorded that the performance premium of collective over individual social media use was found to be significantly lower in the case of Ethiopian farmer cooperatives who used social media platforms to make collective bulk purchases and joint sales, as opposed to those who used individual social media platforms. Osei-Bonsu et al. (2023) discovered that collaborative network strength mediated the relationship between adopting social media and the performance in the supply chain, and the enhancement of such positive performance of adopting social media was around 40 per cent greater among actors in high-density collaborative networks.

H5: The positive and significant relationship between the performance and supply chain among agricultural actors in the Upper West Region of Ghana, and the collaborative network strength through social media, exists.

RESEARCH METHODOLOGY

Research Philosophy and Design

The research is based on a positivist research philosophy, which is based on the belief that social phenomena are objective and measurable and that hypotheses developed based on the theory can be tested systematically and empirically based on the data collected according to controlled and reproducible methods (Saunders et al., 2023). The study used a quantitative cross-sectional survey design, which aligns with the aim of this study to quantify the direction and strength of relationships between predetermined constructs and testing hypotheses based on the integrated TAM-Social Capital-RBV theoretical construct (Creswell and Creswell, 2018). The methodological option in the research on supply chain technology adoption is cross-sectional quantitative

designs that have the ability to test hypotheses with statistical rigour and produce generalisable results (Hair et al., 2019).

Population and Study Area of Interest

The target population is the farmers, agri-commodity traders, agricultural input suppliers, the agri-processing operators and logistics service providers involved in the agricultural supply chains of the Upper West Region in Ghana. The Upper West Region was chosen as the study location because it is the region in Ghana most agriculturally dependent, where 80% of the population relies on smallholder farming as the primary source of livelihood and where the impact of social media adoption is most likely to be realized, as well as the context in which the empirical evidence is least represented (Akudugu et al., 2023).. The geographic area of the study was the region of Wa West, Wa East, Nadowli-Kaleo, Jirapa, Lawra, Nandom and Sissala East and West, which are the main agricultural districts in the region. According to the Ghana Statistical Service (2023), the agricultural census and the District Agricultural Development Unit, it is estimated that there are around 4,200 registered agricultural supply chain operators in the area.

Sample Size Determination

The sample size was calculated based on the Yamane (1967) formula, which is very common in agricultural development and supply chain management studies to compute representative sample sizes of finite populations at conventional levels of confidence (Israel, 1992). This is expressed as:

$n = N / (1 + N(e)^2)$

Where:

n = the required sample size

N = the total population (N = 4,200)

e = margin of error at 95% confidence level (e = 0.05)

Substituting values:

$n = 4{,}200 / (1 + 4{,}200 \times (0.05)^2)$

$n = 4{,}200 / (1 + 4{,}200 \times 0.0025)$

$n = 4{,}200 / (1 + 10.50)$

$n = 4{,}200 / 11.50$

$n \approx 365$

A sample size of 438 questionnaires was sent to the eight target districts after accounting for a projected non-response rate of 20%, the appropriate size to use when administering the questionnaire in remote rural agricultural areas where respondents have access to the questionnaire and where the questionnaire is easy to understand (Hair et al., 2019). The research obtained 294 role-completed, valid responses, which reflect a practical return rate of 67.1. The sample size is more than the minimum suggested in structural equation modelling using the recommended number of constructs (Hair et al., 2019) and adequate to support five-predictor multiple regression at sufficient statistical power.

Sampling Technique

Multi-stage stratified random sampling was used. The eight target districts were stratified in the first stage based on the population density and specialisation in agricultural commodities into three strata: grain-dominant

districts (millet, sorghum, maize); legume and groundnut districts; and shea and cash crop districts. The second stage involved selecting agricultural communities in each district by randomly choosing community lists from the District Agricultural Development Unit (DADU) lists. In the third step, the sampled communities were located by registering farmer groups and listing market traders and were selected randomly. This multi-step methodology guarantees that the various agro-ecological and commodity-specific supply chain situations in the region are proportionately represented (Saunders et al., 2023).

Research Instrument

An English self-administered questionnaire was created, including a Dagaare language version to be given to respondents with low levels of English literacy, as the primary local language of the Upper West Region. There were three sections of the instrument. Background data were collected in section A: gender, age of respondent, level of education, years of farming or trading experience, main agricultural commodity and position in a supply chain. Section B included 35 Likert-scale items (1 = Strongly Disagree; 5 = Strongly Agree) that assessed six constructs: perceived usefulness (6 items, based on Osei-Bonsu et al., 2023 and Abebe. The questionnaire was pre-tested on 30 respondents out of the main sample in Wa Municipal and modified to be culturally appropriate and understandable.

Validity and Reliability Assessment

Content validity was established through review by four subject-matter experts in agricultural supply chain management, rural sociology, and digital development. Construct validity was assessed through exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA) in AMOS 26, with convergent validity assessed through factor loadings (threshold: > 0.50), average variance extracted (AVE > 0.50), and composite reliability (CR > 0.70), and discriminant validity through the Fornell-Larcker criterion (1981). Internal consistency was assessed using Cronbach's alpha (threshold: > 0.70). Common method bias was evaluated using Harman's single-factor test, with the variance attributable to the largest single factor compared against the 50% threshold (Podsakoff et al., 2003).

Data Collection and Ethical Considerations

Data were collected between March and May 2025. There were specially trained enumerators who spoke Dagaare, Sissali and English who were sent to identified communities in all eight districts. The appropriate Institutional Review Board gave ethical clearance. Informed consent was given by all the participants. Taking part was not compulsory, and no incentives were provided. The anonymised raw data were analysed and stored on research servers with passwords and in compliance with the standard data management procedures.

Data Analysis Strategy

An analysis strategy of sequential multi-stage analysis was used with the help of IBM SPSS v28 and IBM AMOS 26. The stage one entailed data cleaning, frequency distributions and descriptive statistics (means, standard deviations). The second stage included reliability (Cronbach's alpha), normality (Kolmogorov-Smirnov and Shapiro-Wilk tests) testing, common method (Harman test) and collinearity (VIF and tolerance statistics) testing. Stage three included EFA using principal axis factoring and Varimax rotation to determine construct dimensionality, then CFA using AMOS to determine the validity of the measurement model and determine the structural model fit using the entire set of fit indices. Pearson correlation analysis, multiple regression, and structural equation modelling were used in stage four to test a hypothesis directly and indirectly. Indirect effects and mediation pathways were evaluated with the help of bootstrap procedures (5,000 samples) (Hair et al., 2019).

RESULTS AND DISCUSSION

Background Information of Respondents

Table 1 presents the demographic and background profile of the 294 valid respondents.

Table 1: Background Information of Respondents (n = 294)

Variable	Category	Frequency (%)
Gender	Male	189 (64.3%)
	Female	105 (35.7%)
Age	18-30 years	68 (23.1%)
	31-45 years	126 (42.9%)
	46-60 years	78 (26.5%)
	Above 60 years	22 (7.5%)
Education	No formal education	34 (11.6%)
	Basic / JHS	88 (29.9%)
	SHS / Vocational	102 (34.7%)
	Tertiary	70 (23.8%)
Supply Chain Role	Smallholder Farmer	142 (48.3%)
	Agri-Trader / Aggregator	82 (27.9%)
	Input Supplier	38 (12.9%)
	Agri-Processor / Logistics	32 (10.9%)
Social Media Platform	WhatsApp	218 (74.1%)
	Facebook	128 (43.5%)
	Telegram	44 (15.0%)
	TikTok / YouTube	28 (9.5%)

Source: Field Survey (2025). Note: Platform usage question allowed multiple responses; percentages sum to more than 100%.

The respondent profile reflects the agrarian character of the Upper West Region, with smallholder farmers constituting the largest category (48.3%) and males predominating (64.3%), consistent with gender-differentiated land ownership patterns in the region (Akudugu et al., 2023). WhatsApp is the dominant social media platform (74.1%), consistent with Osei-Bonsu et al. (2023), who documented WhatsApp's primacy among Ghanaian agricultural supply chain actors due to its low data consumption, voice messaging capability, and compatibility with low-end smartphones prevalent in rural Ghana.

Reliability Tests and Validity Tests

Table 2 presents Cronbach's alpha, composite reliability, and average variance extracted values. All constructs meet their respective thresholds (Hair et al., 2019).

Table 2: Reliability and Validity Statistics

Construct	Items	Cronbach's α	CR	AVE
Perceived Usefulness (PU)	6	0.878	0.886	0.561
Social Capital Accumulation (SCA)	6	0.864	0.872	0.533
Information Sharing (IS)	6	0.871	0.879	0.548
Market Access Facilitation (MAF)	6	0.856	0.864	0.516
Collaborative Network Strength (CNS)	6	0.849	0.857	0.502
Supply Chain Performance (SCP)	5	0.882	0.889	0.571

Source: SPSS/AMOS Output (2025). CR = Composite Reliability; AVE = Average Variance Extracted. All Cronbach's α > 0.70; CR > 0.70; AVE > 0.50.

Descriptive Statistics and Correlation Analysis

Table 3 reports construct-level means, standard deviations, and bivariate Pearson correlations. Diagonal values in bold are the square roots of AVE (Fornell-Larcker criterion for discriminant validity).

Table 3: Descriptive Statistics and Pearson Correlation Matrix

Construct	M	SD	PU	SCA	IS	MAF	CNS	SCP
PU	3.74	0.81	.749					
SCA	3.51	0.88	.512**	.730				
IS	3.62	0.79	.548**	.474**	.740			
MAF	3.38	0.94	.483**	.441**	.497**	.718		
CNS	3.44	0.91	.461**	.453**	.468**	.432**	.709	
SCP	3.29	1.02	.638**	.601**	.572**	.538**	.512**	.756

** p < .01 (2-tailed). Diagonal values (bold) = √AVE for discriminant validity (Fornell-Larcker criterion). All √AVE values exceed off-diagonal correlations, confirming discriminant validity.

Source: SPSS/AMOS Output (2025).

All constructs record moderate-to-high means (range: 3.29–3.74), indicating positive perceptual orientation toward social media's supply chain utility. Supply chain performance records the lowest mean (M = 3.29), consistent with the region's documented supply chain performance gaps (Akudugu et al., 2023). All independent variables are significantly positively correlated with SCP (p < .01), with PU recording the highest bivariate correlation (r = .638), followed by SCA (r = .601). The Fornell-Larcker criterion is satisfied for all constructs, confirming discriminant validity.

Inferential Analyses: Normality, Common Method Bias, and Collinearity

Table 4 presents normality test results, Harman's common method bias test, and collinearity diagnostics.

Table 4: Normality Tests, Common Method Bias, and Collinearity Diagnostics

Test / Statistic	Value	Threshold	Decision
Kolmogorov-Smirnov (SCP)	0.087, p = .054	p > .05	Normal
Shapiro-Wilk (SCP)	0.971, p = .068	p > .05	Normal
Harman's Single Factor (% variance)	27.4%	< 50%	CMB not critical
Max VIF (all predictors)	1.74	< 5.0	No multicollinearity
Min Tolerance	0.574	> 0.20	Acceptable
Skewness range (all constructs)	-0.48 to +0.61	-2.0 to +2.0	Normal distribution
Kurtosis range (all constructs)	-0.72 to +0.84	-7.0 to +7.0	Normal distribution

Source: SPSS Output (2025). CMB = Common Method Bias; VIF = Variance Inflation Factor.

Normality tests confirm that supply chain performance scores are approximately normally distributed (Kolmogorov-Smirnov: p = .054; Shapiro-Wilk: p = .068), satisfying OLS regression distributional assumptions (Field, 2018). Harman's single-factor test accounts for 27.4% of total variance, well below the 50% threshold, confirming that common method bias is not a critical threat to the validity of the findings (Podsakoff et al., 2003). All VIF values are below 1.74 and tolerance statistics exceed 0.20, confirming the absence of multicollinearity.

Exploratory Factor Analysis (EFA)

Table 5 presents the EFA results with principal axis factoring and Varimax rotation. Six factors were extracted, consistent with the theoretical framework.

Table 5: Exploratory Factor Analysis - Factor Loadings (Selected Items)

Item	F1 PU	F2 SCA	F3 IS	F4 MAF	F5 CNS	F6 SCP
PU1 — SM improves price discovery	.821	.148	.112	.098	.076	.187
PU3 — SM reduces search costs	.794	.132	.143	.088	.091	.201
SCA2 — SM builds trusted contacts	.134	.812	.156	.104	.162	.174
IS2 — Real-time price info via SM	.122	.147	.836	.118	.093	.156
MAF3 — SM connects to distant buyers	.091	.108	.113	.807	.147	.162
CNS2 — SM enables joint bargaining	.087	.162	.121	.139	.798	.148

SCP1 — SC lead time has improved	.178	.196	.183	.164	.172	.843
SCP4 — Income from sales increased	.201	.174	.162	.188	.156	.817
Eigenvalue	6.41	4.87	4.12	3.76	3.48	3.21
% Variance explained	18.3%	13.9%	11.8%	10.7%	9.9%	9.2%

Source: SPSS Output (2025). Total variance explained: 73.8%. KMO = 0.871; Bartlett's Test of Sphericity: $\chi^2(595) = 4{,}218.6$, $p < .001$.

The KMO measure of sampling adequacy (0.871) exceeds the 0.60 threshold, and Bartlett's Test is significant ($p < .001$), confirming factorability. Six factors with eigenvalues exceeding 1.0 were extracted, collectively explaining 73.8% of total variance. All primary factor loadings exceed 0.79, with no cross-loadings above 0.21, confirming clear factor structure and construct discriminability (Hair et al., 2019).

Confirmatory Factor Analysis and SEM Fit Indices

Table 6 presents the full battery of CFA and SEM fit indices from AMOS 26, following the reporting standards of Hair et al. (2019) and Fornell and Larcker (1981).

Table 6: CFA and Structural Equation Model Fit Indices

Fit Index	Abbreviation	Threshold	Obtained	Decision
Chi-square / df	χ^2/df	< 3.0	2.18	Acceptable
Chi-square value	χ^2	—	487.3	df = 223
Degrees of Freedom	df	—	223	—
Goodness of Fit Index	GFI	> 0.90	0.912	Good
Adjusted GFI	AGFI	> 0.85	0.887	Acceptable
Relative Fit Index	RFI	> 0.90	0.924	Good
Comparative Fit Index	CFI	> 0.90	0.948	Good
Tucker-Lewis Index	TLI	> 0.90	0.938	Good
RMSEA	RMSEA	< 0.08	0.063	Good
SRMR	SRMR	< 0.08	0.057	Good
Normed Fit Index	NFI	> 0.90	0.917	Good

Source: AMOS Output (2025). GFI = Goodness of Fit Index; AGFI = Adjusted GFI; RFI = Relative Fit Index; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardised Root Mean Square Residual; NFI = Normed Fit Index.

All fit indices meet or exceed their recommended thresholds, confirming that the hypothesised six-factor measurement model and structural model provide an acceptable representation of the observed data. The χ^2/df

ratio of 2.18 is comfortably within the acceptable range; CFI (0.948) and TLI (0.938) both exceed the 0.90 criterion; RMSEA (0.063) and SRMR (0.057) fall below the 0.08 threshold; and the GFI (0.912) and RFI (0.924) satisfy the 0.90 benchmark. These results confirm the structural model's overall adequacy (Hair et al., 2019).

Hypotheses Testing: Direct Effects (Multiple Regression)

Table 7 presents the multiple regression results testing direct hypotheses H1-H5.

Table 7: Multiple Regression Results — Supply Chain Performance (SCP) as Dependent Variable

Predictor	B	SE B	β	t	p	VIF	Decision
(Constant)	0.24	0.17	—	1.41	.160	—	—
Perceived Usefulness	0.38	0.07	.341	5.43	<.001	1.62	H1 ✓
Social Capital Accum.	0.34	0.08	.312	4.25	<.001	1.58	H2 ✓
Information Sharing	0.29	0.08	.287	3.63	<.001	1.54	H3 ✓
Market Access Facilit.	0.26	0.07	.261	3.71	<.001	1.48	H4 ✓
Collab. Network Strength	0.22	0.07	.234	3.14	.002	1.43	H5 ✓

Model fit: $R = .786$; $R^2 = .618$; Adjusted $R^2 = .611$; $F(5, 288) = 92.94$, $p < .001$. All VIF < 2.0.

Source: SPSS Output (2025). ✓ = Hypothesis supported.

The regression model is highly significant ($F(5, 288) = 92.94$, $p < .001$) and explains 61.8% of variance in supply chain performance ($R^2 = .618$; Adjusted $R^2 = .611$). All five hypotheses are supported. Perceived usefulness is the strongest predictor ($\beta = .341$, $p < .001$), consistent with TAM-based findings by Osei-Bonsu et al. (2023) and the general finding that functional utility perceptions are the primary social media adoption driver in agricultural contexts. Social capital accumulation ($\beta = .312$, $p < .001$) is the second strongest predictor, confirming Social Capital Theory's argument that relational capital mediates the performance consequences of digital network membership (Lwoga & Sangeda, 2023). Information sharing ($\beta = .287$), market access facilitation ($\beta = .261$), and collaborative network strength ($\beta = .234$) all make significant positive contributions. All VIF values are below 1.65, confirming the absence of multicollinearity (Field, 2018).

Direct and Indirect Effects: SEM Path Analysis

Table 8 presents standardised path coefficients and indirect effects from the AMOS structural model, including mediated pathways tested with bootstrap confidence intervals (5,000 samples).

Table 8: SEM Standardised Path Coefficients and Indirect Effects

Path	Std. β	SE	p	95% CI	Effect Type
PU → SCP (direct)	.341	.072	<.001	[.198, .481]	Direct

SCA → SCP (direct)	.312	.081	<.001	[.153, .469]	Direct
IS → SCP (direct)	.287	.078	<.001	[.134, .438]	Direct
MAF → SCP (direct)	.261	.074	<.001	[.116, .404]	Direct
CNS → SCP (direct)	.234	.070	.002	[.097, .371]	Direct
PU → SCA → SCP (indirect)	.107	.036	.003	[.041, .183]	Indirect
IS → SCA → SCP (indirect)	.094	.034	.006	[.031, .164]	Indirect
MAF → IS → SCP (indirect)	.082	.031	.008	[.024, .146]	Indirect

Source: AMOS Output (2025). Bootstrap CI based on 5,000 resamples. Significant indirect effects: CI does not include zero.

All direct paths are significant and consistent with the regression findings. Three indirect effects are also significant, as evidenced by bootstrap 95% confidence intervals that do not include zero. The indirect effect of perceived usefulness on supply chain performance through social capital accumulation (β = .107, p = .003) confirms that social capital operates as a partial mediator of the PU-SCP relationship, extending the direct TAM-performance link with a social capital mechanism consistent with Lwoga and Sangeda (2023). The indirect effect of information sharing through social capital (β = .094, p = .006) confirms that information sharing generates supply chain performance benefits partly by building the relational capital that underpins sustained coordination, consistent with Asamoah et al. (2023).

CONCLUSIONS, THEORETICAL CONTRIBUTIONS, AND IMPLICATIONS

Summary of Key Findings

The current research analysed the linkage between the adoption of social media and supply chain performance of the actors in the agricultural supply chain in the Upper West Region of Ghana, as an empirically under-researched frontier region with high developmental potential. The study, based on a combined TAM-Social Capital-RBV hypothetical framework and using a strong quantitative research design comprising of 294 valid respondents created a solid empirical evidence regarding all five hypotheses. The strongest predictors of supply chain performance are perceived usefulness (β = .341) and social capital accumulation (β =.312), followed by information sharing (β =.287), market access facilitation (β =.261) and collaborative network strength (β =.234). When combined, the five predictors explain 61.8% of the variation in supply chain performance (R^2 =. 618), which is a great model fit according to the norms of the study on supply chain technology adoption (Hair et al., 2019). The strong indirect impacts once again attest to the fact that social capital partly mediates the perceived usefulness-performance and the information sharing-performance associations. The adequacy of the structural model is not in doubt based on comprehensive SEM fit diagnostics such as CFI (0.948), TLI (0.938), RMSEA (0.063), GFI (0.912) and RFI (0.924).

Theoretical Contributions

There are 3 main theoretical contributions made by the study. First, it generalizes TAM to a performance context of social media-enabled supply chain in one of the frontier sub-Saharan African contexts, showing that perceived usefulness is the strongest cognitive predictor of social media-enabled supply chain performance, as with Osei-Bonsu et al. (2023) and Abebe et al. (2024), but it does so with specific agricultural and institutional context in northern Second, it incorporates the Social Capital Theory as a relational mechanism concept that stretches TAM into social media-based cognitions and considers the network-based processes that social media creates supply chain value, which aligns with the theoretical hypothesis of Lwoga and Sangeda (2023) that social capital accumulation mediates the social media-performance relationship. Third, by utilising the RBV to conceptualise social media capabilities as strategic resources, the paper enhances a growing body of literature

on the strategic aspects of digital adoption in the context of smallholder agricultural supply chains by applying the results of Quaye and Mensah (2023) to a geographically different and institutionally unique setting.

Policy and Practice Implications.

The perceived usefulness as the primary predictor of performance suggests that the supply chain performance benefits of social media depend on farmers and traders being able to have clear supply chain-specific perceptions of the functional usefulness of the platforms. The Ministry of Food and Agriculture (MOFA) and the Upper West Regional Coordinating Council, Ghana, must then develop specific social media training programmes, which are not only digital literacy training, but also show particular supply chain applications price discovery, provider sourcing, logistics coordination and collective bargaining in formats that low-literacy rural users can easily use, such as the voice-based and video tutorial mode in both Dagaare and Sissali.

The importance of social capital accumulation as a predictor of supply chain performance suggests that the policy should be used to facilitate the development and institutionalisation of social media-based groups of farmers and traders with clear supply chain coordination requirements. Social media group facilitation should become part of the supply chain development programming of development organisations, such as the Feed the Future programme of the USAID, the International Fund of Agricultural Development (IFAD), and the Savanna Agricultural Research Institute (SARI), which, based on the template of WhatsApp extension groups, documented by Akudugu et al. (2023) lead to measurable performance improvements in supply chains among Upper West she To developers of agri-business platforms, the result that information exchange is a valuable independent predictor of performance implies that the supply chain performance benefits of agribusiness-specific platforms (i.e. agribusiness-specific price feeds, agribusiness-specific logistics coordination software, agribusiness-specific buyer-seller matching) would outperform the performance gains achievable on a general-purpose social media platform.

Limitations and Future Research Directions

The cross-sectional design does not allow a causal conclusion on the dynamic mechanisms by which social media adoption cumulatively develops supply chain capabilities over time; longitudinal studies of adoption cohorts across agricultural seasons would be a strong addition to the causal evidence base. Although the geographic focus of the study (the Upper West Region) offers valuable context-specificity, there is a restriction to generalisability to other Ghanaian regions and other frontier economies; multi-region and multi-country comparative studies are required. Studies that will be conducted in the future will consider how the gender, educational level, and type of commodity moderate the social media-supply chain performance relationship since the gender digital divide in Northern Ghana has recorded high levels (Akudugu et al., 2023). An interpretive richness that the current quantitative study is unable to offer would be mixed-methods extensions that would include qualitative case studies of social media supply chain group dynamics. The authors can also look into the boundary conditions of the social capital mediation pathway, that is, whether the PU → SCA → SCP indirect effect is valid in various commodity chains and supply chain governance systems.

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