How do development actors do "ICT for development"? A strategy-as-practice perspective on emerging practices in Ghanaian agriculture

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Abstract

This paper examines how development actors within the Ghanaian agricultural sector enact information and communication technology (ICT) in their day-to-day outreach practices with smallholder farmers. We draw on an in-depth qualitative case study, informed by the theoretical perspective of "strategy-as-practice" to answer the research question: "what ICT-mediated strategic practices are used by development actors in the Ghanaian agriculture sector?" The research findings reveal that (1) the activities of development actors are meshed within a network of interdependencies; (2) the enacted strategic practices reflect the trade-off between novelty of content and novelty of the technologies used to deliver it; and lastly, (3) the praxis of development actors for doing ICT for development consists of hybrid strategies, combining bottom-up approaches consistent with farmers' indigenous smallholder logic, with top-down imperatives framing agriculture "as a business" and nurturing value-chain integration. Consequently, our research points to the impact of ICT initiatives as step-wise and attained over the long term, rather than disruptive and attained in the immediate term.

1. INTRODUCTION

Information and communication technology (ICT) for development (ICTD) initiatives have often been framed as disruptive or transformative (Kleine & Unwin, 2009; Thompson and Walsham, 2010). Furthermore, they have been shrouded in the flurry of anticipation surrounding the introduction of new technologies and their potential applications towards alleviating social concerns. Studies and institutional reports on ICTs for agriculture development—the context of this study—frequently predict the transformative potential of technologies such as mobile devices, remote sensors, cloud computing, or precision agriculture (Ekekwe, 2017; Murugesan, 2013; Wanjohi, 2018; Yonazi, Kelly, Halewood, & Blackman, 2012) to assuage agricultural problems including low agricultural productivity, poor food security and safety, and farmers' impoverishment. Nonetheless, such transformative visions of technology have remained largely the domain of academics,

policymakers, or external donors and have only rarely been shared at the grass roots (FAO, 2017; Oreglia, 2013).

Information and communication technology for development initiatives have been critiqued for their lack of an "emancipatory ethos" and for their failure to generate impetus "driven by local expertise, needs, and adaptive capabilities" (Njihia & Merali, 2013, p. 901). Scholarship has provided development actors with little useful input into the strategic shaping of their interventions. While development actors may espouse wholeheartedly participatory methods (Kendall & Dearden, 2018), they remain subject to a multitude of structural constraints (Bailey & Ngwenyama, 2013; Hayes & Westrup, 2012), which often prevent them from developing genuinely emergent and participatory ICT interventions. Thereby, the need arises for strategic action on their behalf. Yet how to "do" ICTD remains a conundrum for practitioners that has garnered little response from academia. The ICTD literature on agriculture has focused predominantly on evaluating specific interventions or the impact on farmers more broadly (Islam & Grönlund, 2011; Venkatesh & Sykes, 2013; Wyche & Steinfield, 2016). By sidelining the strategic activities of development actors and their concerns regarding how interventions are shaped, extant research has played down the role of agricultural development agents and their praxis. To address this gap, we set out to understand how the "subcommunity" (Henfridsson & Lind, 2014) of development actors in the Ghanaian agriculture sector—consisting of nongovernmental organizations (NGOs), technology-based information-service providers, broadcasters, and agricultural partners and institutions—enacts ICTs as strategic instruments for agriculture development through their day-to-day outreach practices.

Agricultural development in Africa can be understood as the transition from agronomic practices based on cultural-historical rural production and marketing norms (ie, a "smallholder" logic) to practices that structure farming "as a business" and aim at integrating smallholder farmers 2 into global markets (ie, a "value-chain" logic) (FAO, 2017; Miller, Saroja, & Linder, 2013; Yonazi et al., 2012). The turn to information-intensive and knowledge-intensive production and marketing practices is a key element of this transition. Ghanaian agriculture, the focus of this paper, presents a fruitful example for studying the use of ICT by development actors who support the needs of smallholders for advisory (eg, fertiliser application, improved seeds, and soil fertility) and marketing (eg, international standards, grading and sorting, and prices) information services, promote their inclusion into global value chains, and encourage open-market principles (Boohen, 2016; Sarpong, 2004). Most prominently, such actors have aimed to capitalise on the increasing penetration rates of mobile technologies to facilitate the adoption of improved agricultural production practices (Courtois & Subervie, 2014; World Bank, 2012) and enhance coordination and trust among traders (Overaa, 2006). Existing literature suggests that such efforts have experienced mixed levels of success (Aker, Ghosh, & Burrell, 2016; Burrell & Oreglia, 2013; Steyn, 2016), and the adoption of improved production and marketing practices, disseminated via mobile, remains low.

Importantly, research demonstrates that smallholders use a mixture of contemporary and legacy technologies, while relying on in-person channels, accessed through formal and informal networks, for agricultural knowledge and information exchange (Barakabitze, Fue, & Sanga, 2017; Flor & Cisneros, 2015; Hudson, Leclair, Pelletier, & Sullivan, 2017; Islam & Grönlund, 2007; Prakash & De', 2007; Venkatesh & Sykes, 2013). Therefore, in considering the technology-enabled outreach activities of development actors, we maintain a broad understanding of the term "ICT." We view it as encompassing contemporary technologies (ie,

mobile short message service [SMS] and voice technology, web portals, integrated voice response [IVR], purpose-built digital technologies developed in-house, etc), as well as legacy technologies (ie, radio, TV, audio and video recordings, traditional broadcasting, etc). This framing allows us to examine the novelty of technology in its context and to consider the interconnections and complementarities in the ways that development actors use different ICTs, alongside formal and informal in-person channels.

We draw on the "strategy-as-practice" approach (Golsorkhi, Rouleau, Seidl, & Vaara, 2015; Jarzabkowski, 2003; Johnson, Melin, & Whittington, 2003), in particular the work of Jarzabkowski (2005, 2010) and Jarzabkowski and Wolf (2015), inspired by concepts from activity theory (Engeström, 1987; Karanasios, 2018). In this approach, the strategic activities of development actors are not viewed as annual rituals or as things that organisations "have," but rather as things people "do" (Johnson et al., 2003; Johnson, Langley, Melin, & Whittington, 2007). Importantly, the approach focuses on how practitioners construct and enact their strategic practices (Peppard, Galliers, & Thorogood, 2014), the micro-level activities that constitute strategising, and the links between these activities and larger organisational/societal phenomena (Seidl & Whittington, 2014). This enables us to answer the question, "what ICT-mediated strategic practices are used by development actors in the Ghanaian agriculture sector?" To do this, we undertake a qualitative case study of the use of ICT among development actors in the Ghanaian agriculture sector, complementing data from interviews with data from field observations and secondary sources. Our findings show evidence of hybrid strategic practices among development actors. Such practices draw on the "smallholder" logic and its reliance on access to information in person and via legacy technologies, as well as on the "value-chain" logic with information dissemination via contemporary technologies.

The remainder of the paper is organised as follows: Section 2 discusses agricultural development in rural Africa and the emerging role of ICT; Section 3 introduces the theoretical framing of strategy-as-practice; Section 4 describes our qualitative-research approach; Section 5 presents the research results; Section 6 discusses the contribution and its theoretical and empirical implications; and Section 7 concludes by summarising the main findings.

2. AGRICULTURE AND ICT IN RURAL AFRICA

2.1. Agricultural development in Africa

Development of the agricultural sector is a major challenge facing Africa (Collier & Dercon, 2014; Hazell, 2013), where the sector accounts for around 30% of gross domestic product and is an important source of income and employment (Badiane & McMillan, 2015). Policies and government strategies aimed at the inclusion of smallholders in national and international value chains are attempting to transform African agriculture (Christoplos, 2009; Woodard, Weinstock, & Leshe, 2014; World Bank, 2011). Value-chain development is a process associated with improving market access, bridging agronomic knowledge gaps, and aligning smallholders' worldviews with the market's orientation (FAO, 2017; Miller et al., 2013; Yonazi et al., 2012). To achieve this, the efforts of development actors are geared towards uplifting smallholders' practices from ones anchored in the long-standing "smallholder" logic to ones consistent with the incoming "value-chain" logic.

The smallholder logic frames farming as inseparable from the rural way of life and its normative structures. Traditional farming practices such as using basic tools, recycled seeds, and manure (Ekekwe, 2017) contribute to the unsophisticated nature of smallholder production. Adoption of new practices such as using verified seeds and inorganic fertilisers remains low due to its high cost of inputs (Esoko, 2017), resulting in agricultural produce of unverifiable quality (Fafchamps, 2004). Due to the lack of production standards and uniform measurement units, quality and quantity are difficult to verify (Lyon, 2000), presenting a significant barrier to advancing farmers towards the "value-chain" logic (Mukute & Lotz-Sisitka, 2012). Farming produce is sold at local markets or to resident or long-distance traders who buy crops directly at the farm gate (Courtois & Subervie, 2014). Transactions are personalised, informal, cash-based, and governed by indigenous institutions, which complicates the exercise of formal governance and the integration of these normative practices into value chains (Fafchamps, 2004; Noman, Botchwey, Stein, & Stiglitz, 2012). As a result, the smallholder logic leads to produce-heterogeneity and inconsistent produce quality and is dominated by personalised trading relationships and lack of standardisation (Fafchamps, 2004; Noman et al., 2012). Moving away from the "smallholder" logic is prevented in part by the lack of reliable and relevant information on production and marketing (Courtois & Subervie, 2014). Within the "smallholder" logic, in-person channels, informal networks, and oral communication are the dominant interaction patterns. While contemporary technologies are becoming more common, they are typically used for non–farming-related purposes (Burrell & Oreglia, 2013), and there remains a heavy reliance on legacy technology for access to agricultural information.

Meanwhile, the "value-chain" logic frames farming as a business and is led by market rationality whereby individuals make logical economic decisions based on costs and benefits. Interactions and relationships are governed by cooperation, coordination, punctuality, transparency, legal norms, and formal contracts (Miller et al., 2013), rather than by informal and oral arrangements. This logic is consistent with top-down policy strategies for value-chain development and is widely recognised as the way forward for improving the competitiveness of African agriculture (Webber & Labaste, 2010). Coinciding with substantial growth in the coverage and adoption of contemporary technologies, policymakers and development actors have turned their strategising activities towards leveraging the potential of such technologies to better inform smallholders, facilitating their integration into national and international value chains (Aker, 2010; Armstrong, Diepeveen, & Gandhi, 2011; World Bank, 2012).

Table 1 outlines the two logics. It shows the competing pressures facing development actors whose beneficiaries are wholly submerged in the "smallholder" logic and whose strategic actions are geared towards bringing them closer to the "value-chain" logic.

Table 1. Smallholder/value-chain logics and the strategic priorities of development actors

Elements	Smallholder logic	Value-chain logic	Strategic priorities of development actors
Framing	Bottom-up, rural way of life, smallholder practices	Top-down, policy-driven, "agriculture as a business"	Deliver top-down programmes focused on value-chain development, introducing the view of agriculture as a business
Relational networks	Interpersonal	Business contacts	Push towards linking smallholders with more efficient markets
Dominant interaction pattern	In-person, oral, radio-based	Text-based: documents and technologies	Increasingly ICT-based, rapid, real-time information services
Locus of practice	Unsophisticated, production of variable quality	Certifiable, knowledge- and information-intensive production	Improve produce quality through better practices, inputs, and information
Governance	Lack of measurement transparency, lack of standardisation, indigenous institutions	Regulatory norms (eg, measurement units and standards), legal contracts	Introduce standards and best-practice norms
Transactions	Informal market transactions, informal brokerage	Formal exchanges, market-facilitation services	Implement formal contracts, new trading practices, etc
Communication patterns and technologies	Largely legacy technology, informal and formal in-person channels, oral-based and egalitarian	Largely contemporary technology, reliance on written texts and documents	Use technology to provide access to information and better connect smallholders to the value chain

- Sources: Aker (2010), Armstrong et al. (2011), Courtois and Subervie (2014), Fafchamps (2004), Karanasios and Slavova (2018), Lyon (2000), Noman et al. (2012), Slavova and Karanasios (2018), World Bank (2012).

2.2. The role of ICT in agriculture in Africa

The literature on agricultural development by means of ICT has delineated two main approaches, focused on "market efficiency" and "knowledge dissemination" (Kendall & Dearden, 2018). Studies concerned with "market efficiency" have focused on the use of contemporary technologies—in particular, mobile—for coordinating access to agricultural inputs, receiving market information, monitoring financial transactions, storing local market trends, and market information systems (Aker, 2010; Aker & Mbiti, 2010; Miller et al., 2013; Owusu, Yankson, & Frimpong, 2017). Outside of Africa, research has also examined technologies such as e-commerce platforms (Li, Du, Zhang, & Mao, 2018) and information kiosks (Ali & Kumar, 2011). This literature shows mixed levels of success and calls into question the impact of mobile technology on smallholders' market-related practices (Aker et al., 2016; Burrell & Oreglia, 2013; Nakasone, Torero, & Minten, 2014; Steyn, 2016; Wyche & Steinfield, 2016). It demonstrates that the chain of events leading from market price services to positive livelihood outcomes is not straightforward (Srinivasan & Burrell, 2015). Moreover, the behavioural change expectations encoded into interventions motivated by the "market efficiency" theory remain difficult for indigenous farmers to decode and even more difficult to perform (FAO, 2017; Oreglia, 2013).

Studies concerned with "knowledge dissemination" have investigated mechanisms for the provision of meaningful agronomic information to smallholders in developing countries via

contemporary technologies, presuming that these could develop knowledge, uplift production practices, and enhance food security and welfare. As noted by Patra, Pal, and Nedevschi (April 2009), research concerned with access to information and with knowledge transfer has been heavily tilted towards increasing access to contemporary technologies and the mechanisms for doing so, such as the early research on information kiosks (Kumar, 2004). More recent research has focused on IVR as a means of providing "questions and answers" (Kwatani & Markon, 2017; Miller et al., 2013), on the use of mobile technology for consulting with agricultural experts, for accessing weather and climate information, and even for taking photographs of agricultural demonstrations (Caine, Clarke, Clarkson, & Dorward, 2018; Martin & Abbott, 2011). While interventions using contemporary technologies have addressed farmers' perceived information needs, they have met with the criticism that the digital content is plagued by issues around scarcity, inaccuracy, and lack of sufficient explanation (Ali & Kumar, 2011; Islam & Grönlund, 2011; Mubin, Tubb, Novoa, Naseem, & Razaq, 2015; Owusu et al., 2017). Importantly, there is often a misalignment between the way farmers learn about farming and the way interventions based on contemporary technologies are delivered (Kendall & Dearden, 2018; Oreglia, 2013). As an example, Kendall and Dearden (2018) found that IVR systems (which can be used by farmers to SMS questions) provided short-term and succinct answers to farmers' questions (eg, around dealing with pests); however, often more holistic and long-term responses were required to address underlying problems and to stimulate positive change in practices. This was not always possible by means of contemporary technologies.

Synthesising developments within both the market efficiency and knowledge dissemination streams of literature, we see that relying on the latest contemporary technologies—to the exclusion of legacy technologies and rural information practices—can be a questionable practice among development actors. This is significant as currently there is interest around the increased availability of data and services (eg, mobile, cloud, and smart systems) for provision of advisory information (Ekekwe, 2017; FAO, 2015; Wanjohi, 2018). However, while such technologies are promising, it is premature to speculate about their impacts (Ekekwe, 2017). Meanwhile, studies continue to demonstrate reliance on legacy technologies and in-person channels (Esoko, 2017; Hudson et al., 2017) as the most cost-efficient and omnipresent vehicles for the transmission of market information and agricultural knowledge among smallholders (Flor & Cisneros, 2015; Prakash & De' 2007; Venkatesh & Sykes, 2013). Oral communication and strong peer networks dominate as farmers' information sources (Hudson et al., 2017; Mubin et al., 2015; Owusu et al., 2017). Reluctance to adopt contemporary technologies is compounded by challenges such as poor infrastructure, low affordability, low literacy levels, lack of conducive social norms (eg, trust), questionable content quality, and poor integration with smallholders' knowledge and needs (Burrell & Oreglia, 2013; FAO, 2017; Flor & Cisneros, 2015; Molony, 2006; Wyche, Densmore, & Geyer, 2015).

The foregoing discussion raises the question of how development actors could effectively implement agricultural development initiatives, of which ICTs—both contemporary and legacy—form a critical component. It also demonstrates that, given the challenges listed above and the importance of face-to-face and oral interaction in building trust (Duncombe & Heeks, 2002; Molony, 2006), contemporary technologies may not be able to replace other channels entirely. Building on this, Hudson et al. (2017) study found that a combination of both radio and mobile channels for information dissemination greatly increased not only awareness but also adoption of new farming practices. This is suggestive of the need to move away from purely technical solutions and towards an emphasis on "valued ways of being and

doing" (Kendall & Dearden, 2018, p.13). In other words, development actors' effectiveness in stimulating agricultural development via contemporary technologies may well be dependent on developing strategies that accommodate normative rural practices, understanding synergies among various contemporary and legacy technologies, and capturing the complexity of the rural information environment (Hayes & Westrup, 2012; Kendall & Dearden, 2018).

3. THEORETICAL BACKGROUND

To formulate more grounded yet strategic approaches to the use of contemporary technologies, we suggest that development actors and scholars researching ICTD may be helped by understandings from the fields of management, organisations and information systems (IS), and specifically from the contribution of the strategy-as-practice perspective.

3.1. Unpacking strategy in ICTD research

Strategy has been a major stream of research within the field of IS (eg, Galliers, 2011; Levy, Powell, & Galliers, 1999). However, as noted by Peppard et al. (2014), with some exceptions (eg, Arvidsson, Holmström, & Lyytinen, 2014; Henfridsson & Lind, 2014), studies illuminating the micro-processes of IS strategy—referred to as "strategising" or the social process and actual practice of IS strategy—are absent. Few studies report on the people engaged in the real work of IS strategy, and hence, the actual practice of strategy is neglected: "Essentially, the process (es) of IS strategy is (are) commonly treated as a 'black box' by researchers for the most part, with studies skirting around the real work of practitioners" (Peppard et al., 2014, p. 5).

Equally, within development studies and agricultural development in particular, studies have tended to "black box" the processes through which development strategies are produced, implemented, and translated into welfare results. Development strategies have been framed as a set of public policies (at either the micro- or the macro-level) that are pursued through effective investments by governments, international organisations, and NGOs (Dercon & Gollin, 2014). Macro-modelling and general equilibrium work (Diao & Dorosh, 2007) have considered changes in taxes, prices, and technologies, while recent micro-development literature has experimented with alternative interventions (Goyal, 2010). Yet both these approaches have remained largely divorced from practice, and any practitioner-oriented strategic recommendations derived from such studies need to be treated with considerable caution.

With ICTD research occurring at the overlap of the two academic fields, it is unsurprising that investigation of the strategic work of ICTD actors has been neglected. Part of the reason for this is the lack of appropriate theories, approaches, and concepts to frame strategy-related studies. For instance, traditional strategy concepts such as "organisational performance," "planning," and "financial forecasting" are frequently not of concern to ICTD scholars. Furthermore, the methods used by traditional strategy research, such as reviews of organisational performance, are detached from the ICTD discipline. For such reasons, we move away from the traditional framing of strategy and towards the theoretical perspective of strategy-as-practice (Golsorkhi et al., 2015; Jarzabkowski, 2003; Johnson et al., 2003). We adopt this perspective as we are interested in unpacking the "black box" of strategy work (Golsorkhi et al., 2015). In particular, we explore how development actors strategically

implement and undertake ICT-mediated development work, thereby serving as conduits of change.

By turning to the strategy-as-practice literature, we prioritise a focus on the "doing" of strategy (Johnson et al., 2003; Johnson et al., 2007). This approach brings actors into focus (Whittington, 2006), emphasising the micro-level social activities, processes, and practices that underpin organisational strategy (Golsorkhi et al., 2015), rather than its impact on performance. Strategy-as-practice has become a major genre of research in management and organisational studies (Jarzabkowski & Wolf, 2015; Johnson et al., 2007) and to a lesser extent in IS research (eg, Arvidsson et al., 2014; Henfridsson & Lind, 2014). While strategy may appear foreign to the modes of theorising characteristic of ICTD, it is important to note that the strategy-as-practice perspective examines the detailed activities that constitute strategising and links them to greater organisational and societal phenomena (Seidl & Whittington, 2014). The potential of this perspective has been demonstrated through studies of a range of not-for-profit and for-profit organisations (eg, Bagire & Namada, 2018; Jarratt & Stiles, 2010; Jarzabkowski & Balogun, 2009). In our case, it is used to examine the strategising activities of a diverse set of development actors. In moving strategy research away from reified notions of "the firm" and top-down formulations of strategy (Whittington, 2006), strategy-as-practice is not concerned exclusively with the domain of top managers (Jarzabkowski, 2005; Rouleau, 2013) and allows us to accommodate activities at the local, district, national, and international levels.

Significantly, the framing of strategy-as-practice offers the potential to explain and inform some of the challenges that ICTD researchers and practitioners face when undertaking development work (Bailey & Ngwenyama, 2013). For instance, development actors must respond to high-level government policy and to the strategic orientations of international development organisations, NGOs, and other macro- and micro-level actors, as well as to local realities and norms (Bailey & Ngwenyama, 2013; Hayes & Westrup, 2012). Consequently, actors who plan, implement, and undertake development activities must constantly adapt their own strategies to changing environments and pressures from the different stakeholders. This is precisely, the "type of dynamic environment with its mix of independent actors […] that interact with and influence outcomes" that is well suited to the strategy-as-practice approach (Bailey and Ngwenyama, 2013, p. 2).

3.2. Strategy-as-practice and the activity-based view

The strategy-as-practice approach reflects the "practice turn" in the social sciences (Miettinen, Samra-Fredericks, & Yanow, 2009), including in IS (Arvidsson et al., 2014; De Vaujany, Carton, Dominguez-Péry, & Vaast, 2013), which sees all knowledge as existing within the fields of practice (Schatzki, 2001) and human activity. This movement towards practical relevance favours concrete micro-actions over abstract macro-analysis.

Our study is focused on the functions and activities performed by means of ICTs. Hence, we draw on Jarzabkowski (2003) and Jarzabkowski and Wolf (2015) reconceptualisation of activity theory (Engeström, 1987), as represented in Figure 1. The novelty of this lays in harnessing activity-theoretic concepts to fit understandings of the strategic ICT practices of development actors. Jarzabkowski and Wolf work particularly builds on two key elements of activity theory: the notion of object-oriented and tool-mediated activity. Their approach does so by focusing on the "doings" of practitioners (Johnson et al., 2003) and placing their strategic practices at the centre of the complex interactions among development actors,

beneficiaries, and ICTs (Jarzabkowski, 2005). It also brings into focus how ICTs construct strategic activity (Jarzabkowski, 2003). That is, it shows how ICT guides strategy formation (Jarratt & Stiles, 2010) and the enactment of strategy. We continue by outlining how this approach contributes to ICTD research and how it is helpful for our particular study of the strategic use of ICT by actors in agricultural development.

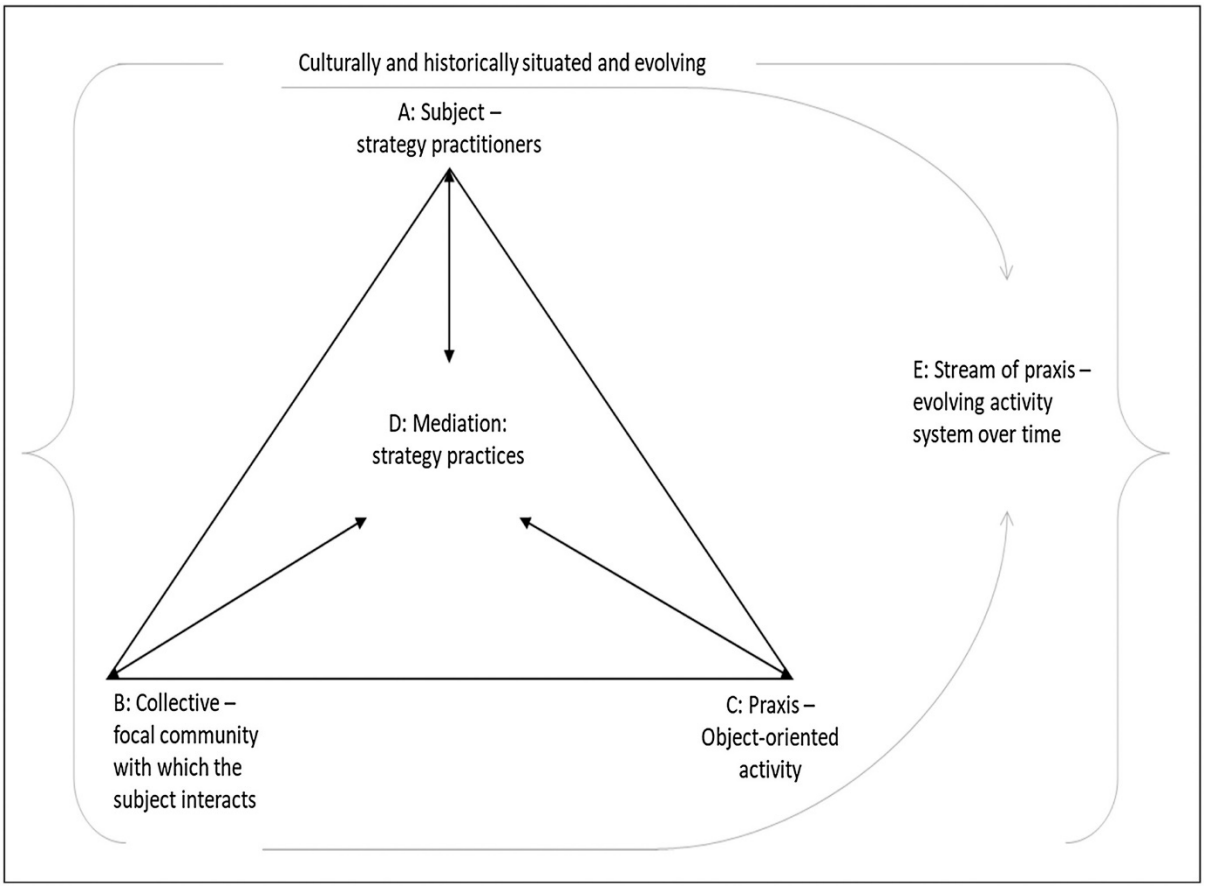

Figure 1. The activity system in which strategy-as-practice occurs

Source: Jarzabkowski and Wolf (2015, p. 170)

Figure 1 shows the subject (A) as the practitioners who do strategy. Such actors are central to all strategy research (Peppard et al., 2014). The subjects' "doing" of strategy is understood in relation to the collective (B), which comprises strategic partners, clients, beneficiaries, etc. The interaction between the "subject" and the "collective" is undertaken in the pursuit of the overarching object-directed strategic activity (C). Strategic practices emerge through mediation (D), which includes interactions between subjects, the collective, and their object and also develop as a response to the tensions among them (Jarzabkowski & Wolf, 2015); they "both lend meaning to and are imbued with meaning by the situation in which they are used. They enable interaction between the participants in the activity system and mediate shifting dynamics of influence in the construction of goal-directed activity" (Jarzabkowski & Wolf, 2015, p. 165). The stream of praxis (E) is the flow of organisational activity over time, as indicated by the curved-inward arrows, implying that the system is not static but is in a constant state of development (Jarzabkowski, 2010). An emerging organisational activity may be considered a situated practice. Meanwhile, as long it becomes diffused and

established as a normative practice, it is referred to as praxis (Sztompka, 1991; Whittington, 2002). By tracing the relational implications of micro-level phenomena, the approach contributes to linking micro- (eg, what development actors do) and macro-level understandings (eg, how development is done) through the work of development actors.

Using this framing, we conceptualise the development actors as the subjects (A) of strategic activities we wish to understand. The community (B) with which the development actors interact consists of smallholders as the prime beneficiaries of their efforts. Furthermore, the community includes development partners from other domains, such as input suppliers, output buyers, technology companies, and outreach specialists. The core object-oriented activity of development actors (C) is geared towards using information for improvements in smallholders' agricultural practices and welfare (ie, aligning with the value-chain logic). We are interested in how ICT-based strategic practices (D) mediate the object-oriented activity (C) and, in particular, how such practices (1) constrain and enable the interactions between development actors and their community of beneficiaries, (2) mediate the community's adoption of and resistance to information, and (3) guide development actors and further shape their organisational practices dedicated to improving smallholders' practices and welfare. The focus on mediation and doing means that the strategy-as-practice view sheds light on the role of ICT in mediating the relationship between development actors and their beneficiaries, as well as the relationship between those beneficiaries and information. The shift in praxis (E) is the change in the activity of the development actors over time. That is, how their strategic practices are shaped through their interactions with the community. Thereby, we are concerned with the praxis of ICTD.

4. METHOD

4.1. Research setting

We develop an empirical case study, examining the day-to-day strategic enactment of ICT by development actors in the Ghanaian agriculture sector as they aim to promote value-chain linkages and development in the sector. This allows us to examine the “how” and “why” (Walsham, 1995; Yin, 2003) of development actors' strategic practices. In particular, we follow the interpretive case study approach as set out by Stake (2006) and Walsham (1995), which is particularly well suited to illuminating the use of IS in organisations (Darke, Shanks, & Broadbent, 1998) and findings in the development context (Li et al., 2018; Puri, 2007). Here, we provide a description of the Ghanaian agriculture sector before discussing how our data were collected.

In Ghana, despite their dominance (Sarpong, 2004), smallholders are the most vulnerable constituents of the agricultural sector. To improve their livelihoods and food security, the government pursues strategies aimed at linking them to global value chains, encouraging open-market principles, and advancing their agronomic practices (Boohen, 2016; Sarpong, 2004). To deliver its agenda, the Ministry of Food and Agriculture (MoFA) has sought to develop sector-wide partnerships with private and civil society organisations, as well as to facilitate multi-party dialogue with donors and international stakeholders. While policymakers, academics, and development actors have considered contemporary technology as key to improving access to advisory information and facilitating adoption of improved agricultural practices, only recently have such services (eg, SMS pricing and weather information) been introduced by international NGOs and by the private sector (Courtois & Subervie, 2014). As in other parts of Africa, legacy technologies and formal and informal in-

person contacts (ie, radio, farm visits by agricultural extension agents from MoFA, and in-person social networks) play a significant role in disseminating agricultural information (Chapman, Blench, Kranjac-Berisavljevic, & Zakariah, 2003; Conley & Udry, 2010).

Ghana has seen telecommunication improvements and steady growth in the penetration rates of contemporary technologies (Dutta & Mia, 2009; WEF, 2016). A key indicator of such progress is mobile penetration, which has grown from 32.4 per 100 inhabitants in 2009 (Dutta & Mia, 2009) to 114.8 per 100 inhabitants in 2016 (WEF, 2016). However, an urban-rural divide needs to be acknowledged in all areas of contemporary technology availability and use (Frempong, 2012; GSMA, 2016). One of the few comprehensive sources of data on information practices in Ghana shows that in the northern region—the agricultural heartland of Ghana—mobile penetration is only 11.9% (AudienceScape, 2009). Penetration rates among rural female smallholders were found to be still lower (Owusu et al., 2017). A recent study of 314 smallholders' use of contemporary technologies found that 82% of farmers use mobile phones that are not smartphones, 58% of farmers receive IVR messages on their mobile phones, and 53% of farmers are illiterate (Esoko, 2017). Significantly, Owusu et al. (2017) found the majority of the smallholder farmers have limited knowledge of the use of mobile phones for agricultural development. Hence, use of sophisticated mobile app-/SMS-based technologies (Murugesan, 2013) remains largely unviable in Ghana. Combined, these studies point to the challenges that development actors face when using only contemporary technologies to engage Ghanaian smallholders and to foster information- and knowledge-intensive agriculture.

4.2. Data collection

Within the Ghanaian agricultural sector, we focus on 18 organisations (see Table 2); this approach has been used previously in studies focusing on organisations within a sector or on a region within a country (Atsu, Andoh-Baidoo, Osatuyi, & Amoako-Gyampah, 2010; Li et al., 2018). Drawing on multiple organisations allows us to explore the case from multiple and diverse perspectives (Darke et al., 1998; Yin, 2003). Multiple data collection methods (Stake, 2006; Walsham, 1995; Yin, 2003) are used, including interviews, field observation, and secondary data, as in other strategy-as-practice studies (eg, Bailey & Ngwenyama, 2013; Henfridsson & Lind, 2014; Jarzabkowski & Balogun, 2009).

Table 2. Participant details

Type of actor	Position, arganisation, and number of interviews	Strategic activities/priorities
Technology-based information-service provider	- CEO: Esoko (formerly TradeNet) (1)	- Provider of technology-based information and communication service for agricultural markets
	- Founder: Literacy Bridge (1)	- Delivers knowledge through technology for smallholders who lack literacy
	- Input promoter/northern regional representative and nationwide sales agronomist: Golden Stork (2)	- Dealer and distributor of agricultural products
Agricultural partner	- Project manager: Integrated Tamale Fruit Company (ITFC) (1)	- Certifies organic products for local/export markets
	- Manager: Ghana Agricultural Associations Business and Information Centre (GAABIC) (1)	- Coordinating body aiming to enhance agricultural production and trade through coordination, capacity-building and information-sharing
Broadcaster	- National coordinator: African Farm Radio Research Initiative (AFRRI) (1)	- Supports and designs participatory farmer-development programmes
	- Presenter/agronomic discussion panellist: Radio Simli (1)	- Community-based radio station focusing on participatory social development
	- Broadcasting generalist: Radio Classic (1)	- Delivers farmer-development information programmes
	- Coordinator: Radio Ada (1)	- Community-based radio focusing on participatory social development
Government	- Managers: MoFA District Agricultural Development Units (4)	- Develops and implements the government's district agricultural programmes
	- Managers: Ghana Agricultural Information Network System (GAINS) (2)	- Library/information system, making agricultural information accessible to support sustainable agricultural development
NGO	- Manager: Presbyterian Agriculture Services (PAS) (1)	- Technical agricultural training, and value-chain and market development
	- Manager: Association of Church-based Development NGOs (ACDEP) (1)	- Network of church-sponsored NGOs focused on agricultural development
	- Outreach specialist: Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA) (1)	- Promotes economic development, focusing on investment, climate-smart agriculture, empowerment and market systems
	- Manager: Engineers without Borders (EwB) (1)	- Develops and manages innovations to address causes of poverty
	- Manager: International Development Enterprises (iDE) (1)	- Business-oriented approaches to increasing income and rural livelihood opportunities
	- Manager: TechnoServe (1)	- Develops solutions linking smallholders to information and markets
	- Market-information officer and Tamale/food security project officer, Salaga: SEND (2)	- Enhances livelihood security through community-based development and pro-poor policies and programmes

In total, 24 semistructured interviews were undertaken (see Table 2) across the 18 organisations, averaging 64 minutes each. Consistent with the gender imbalance in the formal agricultural sector, only three of the interviewees were female. Interviewees had between

8 months and 36 years of experience working in Ghanaian agricultural development. Interviewees met the following theoretical sampling criteria: (1) They held senior positions with responsibilities for outreach and knowledge transfer to smallholder farmers, with experience at local, regional, and national levels, and (2) they had input into the development of strategic directions. Government officials provided confirmation of the issues facing rural agricultural development and, importantly, details of policy-level strategies.

The development actors in our sample spanned a range of nonprofit, private, broadcaster and agricultural development organisations, particularly ones delivering agricultural advisory services and information. While these actors took a grass roots, bottom-up approach (with the exception of government actors) and often used participatory outreach methodologies, their activities were largely driven and funded by national and international top-down policy imperatives. We selected these development actors because they are considered key players in the agricultural space in terms of supporting smallholder farmer activities, providing information, and enabling access to value chains. As such, their strategic activities chart the direction of agricultural development in Ghana. By accounting for a variety of organisations and initiatives, we avoid the commonly encountered limitation of micro-samples (ie, data pertaining to a single organisation) in ICTD research.

The key themes discussed during the interviews aimed at understanding the organisations that the interviewees represented, especially their core mission, their involvement in farming, and their methods for delivering agricultural information to smallholders. Questions focused on the available human resources and capital resources. Interviewees described their key advisory methods and the range of contemporary and legacy technologies, as well as non-ICT means, used for the distribution of relevant agricultural content. Questions also addressed sources of funding available, information or knowledge, sustainability strategies, and strategies for data collection or knowledge production (see Appendix A for indicative interview schedule).

Some of the interviews took place at head offices in Accra and others during visits to field offices. In both types of venue, respondents were forthcoming with numerous additional materials regarding their work, eg, internal documents, radio programmes, monitoring and evaluation documents, leaflets, and photographs and maps of operational activities. Field visits were inevitably accompanied by tours of the surrounding areas and local facilities, introductions to executives, and conversations with partners, volunteers, and community members or beneficiaries—as in Burrell and Oreglia (2013). Significantly, the field observations provided insight into the human and social aspects (Harvey & Myers, 2002) of "doing" ICTD and acted as the setting for informal "real-time" interviews (Barkey & Kunda, 2001). The following are exemplars of observations undertaken. On a visit to Radio Ada, we were taken on a field visit to onion farmers within its broadcasting area, to showcase the impact of radio programming. The radio had introduced farmers to the benefits of using manure on their sandy coastal plots and recommended that they switch from the production of highly perishable tomatoes to onions. On several occasions, we were invited to local events organised by development partners, for example, Esoko partner conferences and the AFRRI annual farm-radio symposium. Liaising with MoFA put us in a position to perform field observations of the routine work of agricultural extension agents. Such visits provided an opportunity to capture interactions with smallholders, conducted formally and in-person; the visits also allowed us to interact directly with smallholders and to understand their worldviews, day-to-day challenges, and attitudes towards ICT. On a field visit to Radio Simli, we were able to interact with guests (eg, experts on fertilisers and extension agents), as

well as with producers of novel broadcasting formats (eg, those that blended drama with agricultural messages).

Secondary data were used as a mechanism of validation, allowing us to check inferences drawn from the primary data sources (Jarvenpaa, 1991). Sources such as radio programmes, information maps, digital solution specifications, and project-monitoring/evaluation reports and learning briefs served as substitutes for records of activities that we could not observe directly (Stake, 1995). In examining these documents, our analysis was organised by the strategy-as-practice framework, yet it was open to unexpected insights (Stake, 1995).

4.3. Analysis procedure

Data collection and analysis were conducted simultaneously to allow understanding to emerge from the theoretical concepts and empirical content (Klein & Myers, 1999). The interviews were transcribed verbatim and entered into NVivo qualitative software for analysis, as were observation notes and memos. In total, several hundred pages of qualitative data were analysed. Saturation point was reached when no new themes emerged from the data.

The goal of the analysis consisted of reaching a theoretical interpretation, driven by strategy-as-practice, that goes beyond description and could inform other similar cases (Langley, Smallman, Tsoukas, & Van de Ven, 2013). While software was important for creating and maintaining a case-study database (Yin, 2003), our analytical “creative leap” (Klag & Langley, 2013) was informed by the theory of strategy-as-practice. It provides understandings of complex phenomena in language-rich and holistic ways, rather than statistically significant but limited ways (Venkateswaran & Prabhu, 2010). Consequently, the number and distribution of coded statements within the interviews were not the primary focus of the analysis. Instead, we relied heavily on interview quotes, examples, and observations as interpretative evidence, building an analytical and explanatory narrative account.

Our analysis therefore followed a two-pronged strategy. Firstly, we applied an open-coding, inductive approach. The transcripts were reviewed word-by-word and coded using in vivo coding (with code names derived from interviewees' spoken language) that reflected the language of practitioners. Whenever possible, codes were grouped into categories. Secondly, the data were analysed using our conceptual framework (Figure 1). The framework guided not only the coding process but also the development of links, relationships, and selective coding (see Appendix B for coding structure). This process involved developing activity systems and documenting the mediating strategic practices. Throughout this process, we constantly compared our codes and continuously compared data and theory based on the emerging evidence (Strauss & Corbin, 1998).

5. RESEARCH RESULTS

5.1. Interdependent activities of development actors

Development actors (A in Figure 1) comprised a set of NGOs, broadcasters, technology providers, agricultural partners, and government agencies. The community (B in Figure 1) that the development actors served consisted predominantly of smallholder farmers, the intended beneficiaries of their outreach work. As information- and knowledge-intensity characterises contemporary agricultural value chains, development actors focused on

improving smallholders' access to and use of cultivation-related information (eg, organic farming practices, knowledge of international standards, and appropriate use of agrochemicals to improve yields), as well as timely market information (eg, market price, weather, and where to buy inputs). Pursuing this goal shaped their shared object-oriented activity (C in Figure 1).

Despite the heterogeneity of the set of development actors, there existed interdependencies among their activities that shaped their interactions and allowed for the emergence of patterns in their strategic practices. For instance, by serving as clients for technology providers, NGOs' impact priorities could become very compelling for other actors in the community, as illustrated by the example of the NGO, SEND. They purchased soya bean market-price information services from the technology company Esoko, subscribed their beneficiaries to direct mobile delivery of the information, and also redistributed it to smallholders via agents and via a local notice board. Similarly, radio broadcasters partnered closely with NGOs, input suppliers, and government agencies to generate relevant content about the use of enhanced agricultural inputs. Thus, the strategic content-generation concerns of some development actors often responded not only to the needs of smallholders but also to the needs of other development actors. Meeting those compounded goals was key to business development. In contrast, other development actors (eg, TechnoServe, EwB, and AFFRI) preferred to create their content in-house. Aside from the reliance on content, there was also collaboration across the activities of agricultural partners in terms of connecting to local and international value chains. For instance, as an importer and distributor of agricultural chemical inputs, Golden Stork worked in partnership with actors concerned with promoting fertiliser use (IFDC) and value-chain development (PAS and ACDI/VOCA). Similarly, EwB delivered its “agriculture as a business” programme in collaboration with MoFA.

Having sketched how patterns and strategic alignments emerged among development actors due to their interdependencies, we now examine how their ICT-related strategic practices mediated their work (marked as D in Figure 1).

5.2. Strategic priorities, practices, and trade-offs

As a versatile group, the development actors maintained a set of different, yet aligned, strategic priorities. Their day-to-day practices reflected this diversity. Technology-based information-service providers focused on content aggregation, content delivery, and technology development. For example, Esoko aggregated knowledge from local and international research institutes and used a multichannel approach through mobile, internet, and call centres to deliver it. Meanwhile, Literacy Bridge focused on acquiring audio content to be delivered by local agents (eg, nurses and extension agents) and developed an in-house, handheld, digital “audio book.” 2 On their side, broadcasters prioritised content creation and extending the reach of the produced content through “multimedia innovations,” which involved promoting radio programmes through SMS services or making radio content available via IVR. Alternatively, government actors implemented programmes to support agriculture and livelihood development, whereby information delivery in-person formed an important element. Similarly, NGOs and agricultural partners prioritised improving access to information by means of legacy technologies (eg, radio). Yet they did not hesitate to combine such solutions with contemporary technologies, especially in complex interventions aimed at improving inclusion in agricultural value chains (eg, cultivation of high value crops such as organic mango or soya beans).

The ICT-mediated practices of development actors resulting from these different priorities were set on delivering the "more accurate information" that smallholders "are currently not getting from anywhere else" (ACDI-VOCA: interview). Development actors were aware of the multiplicity of channels available for reaching out to smallholders, including legacy and contemporary ICTs, and in-person interactions such as formal gatherings and informal visits. Acknowledgment of the preference for oral communication in the Ghanaian rural context ensured that services were often made accessible via voice channels (eg, IVR and radio) or in person, rather than only by text (eg, SMS). This plurality of appropriate technological forms was embedded in the strategies of development actors for delivering information:

We are relatively channel-agnostic. So, we are available via SMS on any phone. We are available on smartphones for Android. We are available on the Web. We are available […] via voice messaging. […] And we also have a live call centre. (Esoko: interview)

A key finding is that development actors faced a strategic trade-off between the novelty of the agricultural advisory content supplied and the novelty of technological mechanisms used for accessing this content (ie, in ways that go beyond existing rural norms). The choice shaped how strategic practices mediated relationships between development actors and smallholders (the link between A and B in Figure 1) and how smallholders related to the information that was targeted at them (the link between B and C in Figure 1). Table 3 unpacks development actors' strategic practices by showing the choices they faced between (1) delivering novel agricultural content that disputed existing practices or content congruent with existing practices (column 1) and (2) using novel or familiar mediums/technologies in delivering such content (column 2).

Table 3. Development actors' strategic practices

Novel content (eg, contests existing practices)	Novel delivery medium (eg, mobile technology/SMS)	Development actors' p\ractices
Yes	No	When information contested existing smallholder practices, development actors avoided using new ICT and instead relied on voice, radio, or in-person visits, etc.
No	Yes	When information delivered did not contest existing smallholder practices but merely constituted an improvement, new ICT was used to deliver information, eg, SMS or Talking Book (handheld audio computer)
No	No	Neither the content nor the delivery medium was novel. This was considered a low-impact strategy.
Yes	Yes	Both the content and use of ICT were novel. This was considered a high-impact (and high-risk) strategy.

The work of technology-based information service providers clearly demonstrates the strategic trade-off presented by the novelty of content and the novelty of its mechanism of delivery. In one example, a technology-based information service provider saw as a continuous priority and as key to the long-term viability of its business to meet the demand for previously unavailable and unfamiliar content that was attuned to the value-chain facilitation aspirations of NGOs (signified by "Yes" in column 1 of Table 3). This provider saw "the commercial sustainability of services [as] driven by businesses that pay and bundle these services for their farmers" (Esoko: interview). Consequently, the company was exposed not only to farmers' unreliable demand for such content but also to their resistance to the novelty of value-chain thinking. To mitigate its vulnerability, the technology provider

enabled multiple mechanisms (ie, internet, SMS, call centre, and training visits) for access to its content. This allowed the provider to enact a strategy, whereas less familiar content (eg, on market prices) was also accessible via more familiar voice channels (eg, a local-language call centre). Balancing the novelty of the content with the familiarity of oral, home-language communication fostered trust in the relationship and in the information that was delivered:

> As we go out and we do our training among farmers, we can sit with a group of 30 farmers […]. We can go through the service and describe to them in fairly simple terms what it is that they want – market prices, some information on where and how to buy fertiliser etc., etc. And there is general nodding, and appreciation. And there is a demo [of] SMS. And they can see the markets and somebody will read it [the information] for them, or their kids will read it. But the minute that you bring out a phone and you ask them to ring the call centre, and they can speak in their local language to somebody, there is trust. And there is a much more familiar environment. So, this has been very successful for us not only in marketing the call centre as a service but in bringing trust and understanding for the SMS service as well. (Esoko: interview)

In another instance, a technology-based information service provider considered the novelty of the delivery mechanism as core to their work (signified by "Yes" in column 2 of Table 3). Consequently, they aligned their innovative technology with established preferences for oral communication and content that affirmed and complemented established farming practices. The NGO, Literacy Bridge, developed the Talking Book, which was particularly useful for illiterate smallholders and best used to deliver non-contested agricultural advice by trusted intermediaries (eg, agricultural extension agents). For example, Literacy Bridge chose not to advocate among farmers the novel and contested practice of buying improved seeds. Instead, via their novel Talking Book device they delivered advice that was aligned with the less radical change of testing recycled seeds to ensure their quality:

> We tell farmers that if […] they buy seeds from the market or they use their own seeds, then they really need to do a germination test. And we explain how to do that germination test, and [that] the results would be to tell them [if] those are good seeds and [if] they should actually invest in those seeds (Literacy Bridge: interview).

The trade-off between content and technology also led the practices of development actors who were not technology-based information service providers. For example, the practices of radio broadcasters were led by the content demands of "the listening public" (Radio Simli: transcribed programme). Such demand was usually sustained by content with a degree of novelty and excitement (signified by "Yes" in column 1 in Table 3). As a result, radio broadcasters sometimes mitigated the novelty of the content by supplementing their radio programmes with in-person visits to their listeners. Radio broadcasters (eg, Radio Simli, Radio Classic, Radio Ada, and AFRRI) used participatory approaches, which encouraged two-way dialogue and eased the concerns of smallholders in adopting the delivered unfamiliar advice (eg, on practices for soil and water management). At Radio Ada, programming was often coupled with follow-up visits from extension agents. This elaborated on the practices advised over the radio waves and balanced the trust inspired by in-person interactions with the tensions surrounding novel value-chain content. Alternatively, when the relevance of content was indisputable (signified by "Yes" in column 1 in Table 3), broadcasters developed multimedia innovations to increase its accessibility by smallholders. They often supplemented radio content through phone-ins (via mobile technology). More

significantly, broadcasters' strategies were mediated through SMS campaigns, alerts, and IVR systems to increase smallholders' exposure to agricultural information and awareness of advisory practices. SMS campaigns and alerts involved broadcasting the telephone numbers of extension agents, as well as reminders of when relevant content would be aired. Meanwhile, the use of IVR blended the novelty and accessibility of new mobile phone technology with a traditional preference for oral communication:

> An SMS alert is sent to remind farmers of meeting times when the programme is aired, to enable them (to) listen. There is another technology that involves announcing the telephone number of extension agents on-air, so farmers are able to call for information they need. There is another technology that enables farmers to call in and listen to the recorded program. (AFRRI: interview)

The strategic trade-off between the novelty of content and its delivery mechanisms also led the practices of government agencies (eg, MoFA), NGOs (eg, ACDI/VOCA and PAS), and commercial agricultural partners (eg, ITFC and Golden Stork), all of who delivered complex interventions aimed at agricultural development. Integrating value chains, promoting use of improved inputs (eg, seeds or inorganic fertilisers), and introducing growing practices of global standard were among their key messages (signified by “Yes” in column 1 of Table 3). As such content was new—and could be challenged, resisted, or ignored—they traditionally relied on delivering it to farmers' in-person and through tangible demonstrations, such as show plots. Nonetheless, we saw them increasingly collaborating with radio broadcasters to produce content-delivery formats that were aligned with the communication preferences of smallholders and were conducive to eliciting radio-based interactions:

> So, [radio] is a really great tool to get them information, more accurate information, the type of information they are not currently getting from anywhere else. Especially, specifically when it comes to running their farm as a business, right, because that seems to be a big problem with small-scale farmers. (ACDI/VOCA: interview)

In addition to radio, other legacy technologies such as video screenings of documentaries using mobile equipment provided by MoFA were used to complement the delivery of novel agronomic content. Such installations consisted of vans fitted with projectors and screens and capable of travelling to remote rural locations, to inform smallholders about new practices, thus blending local interaction with ICT and novel information on how to improve practices:

> Farmers like to see what they are doing. We do a documentary of what is done and how it should be done. Then we play the documentary. We record their mortality rates for livestock and compare, using mobile extension units from MoFA. (PAS: interview)

In summary, development actors, in raising awareness of novel, unfamiliar, and difficult-to-understand advice, often chose to supplement it with in-person contacts and demonstrations, or explanations and interactions via legacy technologies. Meanwhile, when implementing ICT interventions involving unfamiliar technologies, development actors chose agricultural advice that was not in contention with dominant practices within the established smallholder logic. By avoiding tensions with existing agricultural practices, development actors minimised the likelihood that advice received via ICT would be challenged. Thereby, the enacted strategies consistently balanced novelty of content with novelty of dissemination technology.

5.3. Praxis of development actors' work

We find that the praxis of development actors' work (E in Figure 1) was characterised by long-term strategies balancing the novelty of content with the novelty of the technology used for its delivery. Such hybrid strategies were prompted by the need to offset new delivery mechanisms with the provision of additional services such as contemporary technology trainings or the need to offset the unfamiliarity of agronomic content with additional advisory services delivered in person. For Literacy Bridge, the hybrid strategy of bundling noncontested content presented in an oral format with an unfamiliar contemporary technology resulted in high levels of trust and adoption for the technology. Thus, in their decisions around impact strategy, the purpose-built Talking Book technology and the disseminated content were inextricably linked:

> We are very rigorous about the objectives we are trying to achieve [...] we know what we want to see farmers do and […] what we are trying to see change. And then the content [service] is going to address that. (Literacy Bridge: interview)

The alternative hybrid strategy of bundling unfamiliar agronomic content with established legacy technologies and in-person visits also generated trust and prompted changes in farming practices. For example, ACDI/VOCA relied on field agents and radio in promoting value-chain linkages. Yet further enhancing such a strategy with contemporary technologies opened pathways for new forms of interaction and new information flows. For example, smallholders were able to receive and request practical information about payments and processing schedules from development actors, whereas, previously, they had been the passive recipients of information or had not been contacted at all:

> So, they [agriculture processors] will be communicating with their outgrowers [smallholders] via SMS technology to let them know when they are processing; when payments are coming […]. Farmers can SMS questions into the system. So, it is a form of two-way communication to ensure that there is accurate information flows. (ACDI-VOCA: interview)

While we encountered low-risk strategies, with a low degree of novelty in terms of both content and delivery mechanisms, such strategic choices were not particularly common or viable in terms of donor funding. High-risk strategies—with novelty in terms of both content and delivery mechanisms—stood out and were often mentioned in discussions, yet development actors were aware such strategies could fall short of expectations. Where novel content was delivered by novel means, development actors ensured impact by reinforcing the novelty with investments in support services such as training and information verification. For example, information on market prices delivered by SMS raised the need for additional training and verification. Since farmers were familiar with traditional volume units (eg, bags and bowls) rather than weight measurements (ie, kilograms), they could not make sense of prices based on kilograms: “a challenge […] is [that] the particular [market] information is given in kilograms. The challenge for farmers is the weighing scale” (SEND: interview). Development actors could alleviate the discrepancies in smallholders' understandings of the market information they received by engaging fieldworkers who could then explain to smallholders the meaning of weight measurements and of the SMS messages received. SEND also developed mechanisms for cross-checking the validity of soya bean price information, using informal market visits or phone calls to market sellers to ensure that the information provided to smallholders had been verified and could be trusted.

6. DISCUSSION

6.1. How do development actors “do” ICTD?

Our study demonstrated that the strategy-as-practice perspective can generate insights into ICTD and assist in understanding the critical issue of how development actors “do” ICTD. It allowed us to make actors who “make a difference in practice” (Peppard et al., 2014, p. 1) central to our research. When developing and enacting strategy, development actors respond to top-down imperatives from government as well as from international development organisations, NGOs, local players, and other actors (Bailey & Ngwenyama, 2013; Brigham & Hayes, 2012). They must also clearly align with the bottom-up, normative practices of the intended beneficiaries (Hayes & Westrup, 2012; Miscione, 2007) to avoid design-reality gaps (Stratton, Sholler, Bailey, Leonardi, & Rodrguez-Lluesma, 2016). In answering our research question, we show how development actors needed to respond to pressures from the smallholder and the value-chain logics and, in so doing, enacted “hybrid” strategic practices that shaped their praxis (E in Figure 1). In addition to providing a better understanding of how development actors “do” ICTD, we show how their activities are moulded by the challenging environment in which they operate.

We showed how development actors' strategic practices leveraged both the smallholder logic (eg, cultural practices in agriculture and oral channels) and the value-chain logic (eg, improved and standardised practices in agriculture and digital channels). This reveals an understanding among development actors of the significance of engaging with smallholders and of the importance of hybrid strategic practices in promoting changes consistent with the value-chain logic. Understanding of how development actors balance the nuanced interplay between these two logics in enacting their strategic practices is a key contribution of our research.

While the literature has tended to focus on how ICT—especially contemporary technologies—can transform smallholders' livelihoods, our findings suggest that development actors have strategically refrained from openly challenging established norms around communication and agricultural practices when using ICT. Instead, they have preferred more gradual approaches that were less disruptive and more readily received. This is an important contribution to the literature; it can also help inform the work of development practitioners and their interventions given increased interest in leveraging the potential of the latest technologies (eg, precision agriculture, drones, and sensor networks) in rural agriculture. Our work brings realism to the literature by illustrating clearly the practical significance of generating balanced strategies for grass roots interventions and acknowledging the socially embedded nature of technology (Avgerou, 2010). With the exception of perspectives from design science, participatory, and interventionist research (eg, Gregor, Imran, & Turner, 2014; Robinson & Imran, 2015), few studies have offered this type of strategic understanding. Furthermore, few capture the nuanced interplay between contemporary technologies, legacy technologies, and social carriers of information (Dewan, Ganley, & Kraemer, 2010; Hudson et al., 2017) in propelling change in the rural agricultural context. Instead, researchers tend to take on a mono-technology focus (Caine et al., 2018; Martin & Abbott, 2011), sidelining the issue of how new technologies take root, coexist, and compete with existing information norms. We showed how development actors looked for complementarities across different technological (eg, radio and mobile) and nontechnological (eg, face-to-face demonstrations) mediums. These considerations are particularly important in rural settings where legacy technologies and traditional information norms dominate, while

personal networks contribute significantly to magnifying information reach (Barakabitze et al., 2017; Flor & Cisneros, 2015; Hudson et al., 2017; Islam & Grönlund, 2007; Prakash & De' 2007; Venkatesh & Sykes, 2013). Our study broadens the research focus and examines the novelty of technology in its context. We trace how development actors use combinations of legacy technologies, contemporary technologies, and non–technology-based mediums. We thus avoid relegating issues around ICTD to any particular technology—and consequently resist the allure of technological fads (Kleine & Unwin, 2009). At the same time, we have signalled how mobile acts as a conduit for practices consistent with the smallholder and value-chain logics. We demonstrated the advantages of adopting situated approaches that account for multiple technologies and local complexities. While such work may lack the "headline-grabbing" quality characteristic of studies dedicated to currently trending technologies, it avoids straightforward assertions of causality. It is theoretically rich and well positioned to enhance the practical relevance of ICTD research.

6.2. Understanding change

It has been noted that the interrelationship between the macro- and micro-contexts is key to developing a comprehensive understanding in ICTD studies (Lin & Myers, 2015). A contribution of this paper is that it bridges the micro- to macro-gap. That is, it addresses how activities at the micro-level interact with those at the macro-level (ie, praxis), offering a better understanding of the role of development actors in shaping change. In essence, our approach provides an alternative narrative of the process of change.

Within the ICTD literature, there is a desire to assign quantifiable impacts to ICT. Having been exposed to this discourse, development actors in our study continuously sought to provide such impact measurements. They pointed to a "ten per cent revenue increase for farmers" (Esoko: interview) using mobile price-information systems (see Courtois & Subervie, 2014); an average percentage increase "in total crop production of 45%, compared to non-users' decrease of 4%" by Talking Book users (Literacy Bridge: interview); and increased "knowledge [about a new rice variety] [of] over 80%" (AFRRI: interview) among radio listeners. Others quantified the impact of their activities in terms of increased sales of improved inputs such as fertilisers (eg, Golden Stork), which signified a change in practices. While the rhetoric of practitioners suggested transformative change, we propose—through our understanding of the emergent strategic practices of development actors—that a praxis geared towards step-change was being developed. The argument for step-change is a key finding of our research and goes against broad-brush statements about the impact of ICTs (Jensen, 2007; World Bank, 2012). Based on the practices of the development actors (ie, those providing the information and shaping change), our study suggests that ICTs do not offer a shortcut to improved development outcomes. Others have made similar arguments in recent work, dispelling the "myth" of market price information (Burrell & Oreglia, 2013; Wyche & Steinfield, 2016), calling into question the use of quantitative impact measurements (Aker et al., 2016; Burrell & Oreglia, 2013; Steyn, 2016), and favouring a view that ICT enables incremental changes (Duncombe, 2018). Our work contributes to this growing body of work by suggesting consideration be given to a range of ICT strategies, from hybrid (aimed at delivering step-changes) to high risk (aimed at transformative impacts). In a donor environment that favours quick impact narratives, understanding the appropriateness and viability of a range of strategic approaches can considerably improve the effectiveness of donor-supported efforts. Furthermore, broadening the scope of development goals to include learning processes and step-wise changes may offer more meaningful—albeit less speedy—development pathways.

6.3. Contribution to strategy-as-practice

We contribute to the strategy-as-practice literature in two key ways. Firstly, we extend its focus beyond conventional organisational settings into the development sphere where actors must balance different competing pressures (Bailey & Ngwenyama, 2013; Hayes & Westrup, 2012). In doing so, we link the development actors' strategic ICT choices to the development of larger societal phenomena, showing not only how development actors interact with smallholder farmers but also how their strategic practices contribute to shifts in agricultural praxis. By doing so, we demonstrate that development contexts can be a fertile setting for strategy-as-practice studies and, importantly, for linking strategic activities to societal phenomenon (Seidl & Whittington, 2014). We argue that understanding the ICT-mediated strategic practices of development actors aids understanding of the praxis of development. Strategy-as-practice could also be used to understand why some ICT initiatives and projects fail to deliver their intended strategic change (Arvidsson et al., 2014). Secondly, with some exceptions (Henfridsson & Lind, 2014; Jarratt & Stiles, 2010), our research is one of the few strategy-as-practice studies to underscore the role of ICT in mediating strategic practices. In contrast to other strategy-as-practice studies, we found that, to achieve their objectives, practitioners faced strategic choices in terms of content and technology when interacting with their beneficiaries. Such findings are new to the strategy-as-practice research, which is undertaken predominantly in developed countries and where meanings carried by information services and ICTs are much more widely shared.

6.4. Limitations

As with most qualitative research, our attempt to build and elaborate theory from a limited sample should be treated with caution. Rather than claim “universalism,” our research leans towards “particularisation,” as it is embedded in a particular indigenous setting (Davison & Martinsons, 2016); thus, the reader may recognise similarities between the findings of our research and similar contexts. We contend that the findings provide a broader understanding of practices among development actors and smallholders in rural Africa and in other rural agricultural settings in developing countries. A potential weakness of our study is the limited inclusion of smallholder farmers in our data collection design. Our focus was on development actors, their organisations, and their strategic practices. Consequently, smallholders were only given a voice through interactions during field visits and second-hand accounts from development actors. Nonetheless, we acknowledge that their role in co-creating effective ICTD strategies needs further examination. In future studies, we recommend expanding the data collection mechanisms to account for the dynamic of co-creation between development actors and beneficiaries.

7. CONCLUSION

This paper has examined the practices of development actors and how they do ICTD. We found that development actors enacted strategic practices that combined farmers' bottom-up, normative practices, with top-down imperatives around developing smallholder farming as a business and nurturing value-chain integration. A key contribution of the research is understanding of the strategic trade-off development actors faced between the novelty of the agricultural advisory content they supplied and the novelty of technological mechanisms used for accessing this content (eg, in ways that go beyond existing rural norms). The choice shaped how strategic practices mediated relationships between development actors and smallholders and how smallholders related to the information that was targeted at them. By

examining the ICT practices of development actors across a range of technologies, we challenge the focus on the latest technologies and the commonly adopted mono-technology perspective in ICTD. By doing so, we add to the growing literature that recognises the mixed results of ICTD in agriculture and the unfolding incremental, rather than radical, change processes it engenders.

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APPENDIX A: HIGH-LEVEL INTERVIEW SCHEDULE

1. Organisation profile and background
2. Public, private, community (or other)?
3. Profile of the interviewer
4. Overview core mission and how the provision of agriculture extension/training/information/advice services fit within core business
5. Human capacity (number of employees, education, skills, and experience) and resources available (budgets, building, and field vehicles)
6. Is provision of agriculture extension and information services a core business for your organisation or project-based?
7. What are the specific performance targets/objectives for this service?
    i. What does it aim to accomplish?
8. How do you (your organisation) know that the project is achieving its goals?
9. What sustainability strategies does your organisation (or donor) have in place?
10. Would you describe the advisory content distributed by your service as information and/or knowledge?
11. What is the primary source of the information/knowledge dispersed?
12. Is the information/knowledge internally generated, or acquired from external partners?
13. How confident are you in the reliability of the information/advice you provide?
14. Can you describe briefly the training activities performed by the project?
15. What groups (agriculture extension agents, smallholder farmers, commercial farmers, farmer based organisations, and local government) are the clients of your advisory service?

    i. How many clients in each group?
16. What are the training/advisory methods (demonstrations, field schools, short courses, and discussion groups) used?
17. What technologies (specific in-house technology, internet, telephone, mobile applications, handheld devices, rural radio, television, and public access facilities) are you using for the distribution of the advisory content?

    i. How are they applied?
18. How has agriculture changed in recent years?
19. How has your use of ICT changed over the last 5 years?
20. What are some of the challenges you have faced in shifting farmers from traditional farming practices towards more modern practices?

    i. In terms of communication and information practices
    ii. In terms of agriculture practices

APPENDIX B: CODING STRUCTURE

Level 1	Level 2	Level 3
Development actors	Organisation strategy and focus	Development objective
		Financial sustainability
		Organisation philosophy
	Focal community and connections	Activity type
		Partnerships
		Connections
		Alignment
		Interdependencies
Development actors strategic practices	ICT-mediated practices	Value-chain logic
		Smallholder logic
		Hybrid logic
		Low risk
		High risk
		Strategic trade-off
	Concatenation	Novel content
		Novel delivery
		Old ways of doing things
		New praxis
		New ICT with legacy ICT
		ICT with non-ICT means
	ICT-based modality	Mobile SMS
		Mobile voice
		Internet
		IVR
		Other
Smallholder ICT and information practices	Formal modality	Farmer organisations, cooperatives, and unions
		Extension office
		Farming-supply vendors
		NGOs
	Print-and-broadcasting modality	Radio
		Traditional broadcasting
		Print
	Informal modality	Family and friends
		Other farmers
Smallholders	Practices	Agricultural practices—production
		Agricultural practices—marketing
		Communication and information practices
	Information and communication characteristics	Language
		Literacy (preferences for voice/text)
	Information and communication norms	Openness and sharing
Tensions/contradictions	Between development actors and smallholders	Cultural-historical norms vs value-chain logic

Level 1	Level 2	Level 3
		Manifested from new practices
		Resolution
		Resistance to value chain logic