

IMPACT OF ICT INVESTMENT, OWNERSHIP AND USE IN THE CASSAVA VALUE CHAIN IN SOUTH WESTERN NIGERIA

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EXECUTIVE SUMMARY

Context

Most of Africa's peoples live in rural areas where agriculture is the main economic activity. In Nigeria, for instance, agriculture is the occupation of more than 60 per cent of the total work force, providing both formal and informal employment for people (Opara, 2004). African agriculture is however dominated by small and medium enterprises (SME) and characterized by traditional technologies and low productivity. African agriculture needs to be transformed with optimal mixes of both production and information communication and technologies (ICT) in order to improve rural and national wellbeing in African countries. ICT comprise the know-how, in the form of pieces or systems of equipment and human skills, to deliver data, information and knowledge to support human activities. Although ICT have proven to be levers for improving efficiency and productivity in many sectors worldwide, there are still unanswered research and policy questions on how, when and what levels of ICT investment and use would be most beneficial to small scale African agriculture and how such investment and use may be promoted.

What is the problem?

Nowadays, ICT are often seen as transformative tools because they can be used to redesign and transform business processes (Semogyi and Galliers, 1994). In developed economies, ICT have also been used in research and development to produce improved crop varieties, to provide and access agriculture-relevant environmental and market information, and to develop computerized farm management information systems. But agricultural enterprises in developed and developing countries are worlds apart in terms of scales of operation. This begets the important question about the kinds of ICT that can be used in the business processes of agricultural value chains in African countries. A value chain describes the full range of activities required to bring a product or service from conception, through the different phases of production and input of various producer services, to the delivery to final consumers (Kaplinsky and Morris 2007). By breaking a chain into its constituent parts of design, supply, production, and distribution, one can better understand its structure and functioning. Technology, including ICT, is employed to some degree in every value creating activity, and changes in technology can impact competitive advantage by incrementally changing the activities themselves or by making possible new configurations of the value chain. This study therefore investigated the patterns of ICT investment and use in the cassava value chain in South-western Nigeria as a case study. It also explored the possible effects that uses of ICT have or could have on production process and outcome variables in the value chain, and policy strategies to promote optimal ICT investment and use in the value chain.

ICT investment and use in agricultural SME

Some studies of agricultural firms and SME in Africa and elsewhere have found evidence of the potential beneficial use of ICT in different productive activities. Matambalya and Wolf (2001) found a positive correlation between enterprise size and use of advanced ICT among SME. They concluded that ICT use increase the competitiveness of SME by facilitating information flows and reducing transaction costs. De Silva and Ratnadiwakara (2008) found that ICT investment reduced the

transaction costs of smallholder vegetable farmers. Jenson (2007) showed that the adoption of mobile phones by fishermen and wholesalers was associated with a dramatic reduction in price dispersion and the complete elimination of waste. Adekunle and Alluri (2004) reported on a pilot project that was implemented in South Western Nigeria which provided farmers a multi-purpose community information access point with basic ICT infrastructure including Internet access, training, online materials, farm equipment, and links to the community help desk and inputs and output markets. Analyses of panel data from the farmers showed that the participating farmers increased their holdings, external inputs used, and productivity leading to higher incomes with attendant evidence of graduation into commercial farming. Nevertheless, many other studies of small scale farmers in Africa have found very low use of modern ICT for accessing agricultural knowledge and information. May, Karugia and Ndokweni (2007) observed that among the factors affecting use of ICT in agriculture were poor information sharing culture and inappropriate ICT use promotion policies, especially those addressing rural communities.

Methodology

The study used a model that identified some potentially important relationships among the following variables: (1) firm variables (size, age, production orientation, amount of credit taken, change agent visits received); (2) firm owner variables (sex, age, education, business skills/experience, risk behaviour, credit behaviour, participation in trade and credit associations); (3) ICT investment ownership and use variables; (4) production input variables, i.e. quantities, prices and values of inputs; (5) production process variables, such as communication and market participation diversity and intensity, information processing diversity, research and innovation, and managerial style; and (6) Production output variables, i.e. quantities, prices and values of output.

Data were collected primarily through in-depth structured interviews with 139 sampled cassava growers, processors and marketers in three of the five agricultural zones of Oyo State in South-Western Nigeria. Both snowball and ransom sampling techniques were used to locate the interview respondents. Frequency tables, correlation and ordinary least squares regression methods were used to explore the levels and patterns of interrelations among the variables.

Findings and discussion

Value chain participants owned mainly radio (83.5% of the respondents), cell phones (80.6%) and TV sets (58.3%). The percentage for radio is similar to that reported by Aderinoye et al. (2007) for all Nigerians (81.4%). Most respondents in the survey stated that phones were the most valuable in supporting their business activities, with radio and TV providing much less support, and only very few of them using other more sophisticated or less accessible ICT such as computers, business centre services and Internet services.

The significant predictors of ICT ownership, investment and use among growers, processors and marketers were age of firm, and the firm owner's gender, age, education, knowledge, credit seeking and extent of participation in trade and credit associations. Most of these variables are environmental connectivity and exposure variables, and signposts the need to encourage younger and better educated people to venture into cassava-related businesses, as well as educational programmes and information and business networks that expose the value chain participants to new ideas and innovations, including the innovative uses of ICT.

ICT-related variables were not important variables for predicting output values and output-input ratios in the value chain activities. Instead, some of the firm, firm owner and production process variables, particularly firm size, communication diversity and intensity, were the significant predictors of output values and output-input ratios in the value chain activities.

A priori, ICT use is likely to help growers both in sourcing for improved inputs and growing methods, and favourable prices for inputs and output. For processors however, ICT use is more likely to help in sourcing for favourable prices for cassava produce and output of cassava products, and less likely to

help in the technical processing aspects of their business, as the processing technology is currently mostly basic and stable. Marketing provides the widest scope for the profitable use of ICT, because both the core and boundary spanning aspects of marketing entail communication or information processing. This often provides marketers with better access to market information than either growers or processors, and marketers often use this advantage for arbitrage or speculative purposes. Okoh and Egbon (2006) had concluded that there is some factor, most probably arbitrage, which ensures that foodstuff prices in Nigeria's urban and rural markets bind together. The findings of this study suggest that communication diversity and intensity, facilitated increasingly by the ready access to, ownership and use of cell phones, may be an additional factor.

ICT ownership and ICT use correlated directly with, and helped growers and marketers respectively to obtain better prices for produce or products. The findings in respect of growers and marketers support those of Jenson (2007) that the adoption of mobile phones by fishermen and wholesalers was associated with a dramatic reduction in price dispersion and near-perfect adherence to the law of one price. The law of one price is however likely to be favoured by cassava growers and processors more than marketers, because it assures them that they would not be victims of speculating marketers.

Finally, the analysis of the transmission mechanisms that interconnects ICT access, investment, ownership and use with output prices in the value chain suggests that ICT use is unlikely to progress beyond basic low-end ICT in the absence of growth in the operations and output of value chain participants catalyzed by expanded demand for cassava produce and products.

Implications for policy makers

Women-dominated processors were the least educated compared to the male-dominated growers and the marketers, and were least inclined to explore markets and engage in frequent market transactions. They were also less likely to own, spend on and use ICT. Most of the much fewer male processors tended to have medium- than small-scale processing facilities which they often rented out for specific processing jobs by other, mostly female, processors. These findings indicate the need for policy strategies that target existing women processors towards enabling them to improve their general and ICT literacy through adult education and extension programmes. Also needed are programmes to attract better educated female processors and promote women-controlled cassava processing associations or societies that engage in thrift, credit and collaborative investment, processing and marketing activities.

ICT use among the cassava value chain participants was limited to basic and low-end ICT, primarily radio, TV and cell phones. Such ICT are only relevant mainly for communicating or accessing orally exchanged information, little effort to store the information for future use. As highlighted earlier, some previous studies had found direct association or correlation between ICT investment and use and the performance of agricultural SME. However, high levels of ICT use might actually be the result instead of the cause of higher scale of operations and output, as growing firms seek to support their business with more efficient communication and information processing tools. In that case, ICT use should be seen as the dependent variable, and policy should target strategies to promote larger firm sizes in order to improve ICT use among the firms.

Policy also needs to recognise that ICT is never used in productive activity for its own sake, but in order to support, promote or transform the activity. Thus, the key to ensuring higher investment in and use of ICT in value chain activities would be conditions that create increasing need among agricultural SME to obtain, analyse or store market information which, in turn, depends on the participants' perceptions of uncertainties in existing markets or inadequate knowledge of emerging markets. Promoting ICT investment and use among value chain participants in isolation may not lead to significant ICT use uptake. The right strategy would be to stimulate higher investment and scale of cassava growing, processing and marketing activities alongside initiatives to improve the accessibility, ownership and use of ICT by the SME.
