



Factors influencing the use of alternative land cultivation technologies in Swaziland: Implications for smallholder farming on customary Swazi Nation Land

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ARTICLE INFO

Article history:

Received 6 October 2011
Received in revised form 8 December 2012
Accepted 11 December 2012

Keywords:

Land cultivation
Smallholder farmers
Swazi Nation Land

ABSTRACT

Poor land preparation and late planting are among the factors responsible for the decline in food production on customary Swazi Nation Land (SNL). While efforts are being made to develop an improved national land cultivation programme, this process can be helped by identifying factors that influence farmers to use alternative technologies for land cultivation. Using cross-section data collected in 2009 from a random sample of 210 farmers in Komati, three land cultivation technologies were identified; (i) use of tractors; (ii) use of draught animals; and (iii) use of hand hoes. For a country like Swaziland where human health problems, particularly HIV/AIDS, make manual labour a scarce resource, the use of tractors is regarded as a modern technology that can achieve time and labour savings. The empirical evidence from this study indicates that the use of tractors is significantly influenced by household wealth and size of arable land used by households. However, given that land holdings on customary land are generally small, sparsely distributed and often fragmented, tractor hire service providers face relatively high overhead and transaction costs. Furthermore, investment in mechanised farming by individual SNL households is constrained by the lack of secure tenure. Given these challenges, this study makes recommendations for creating an enabling environment that could promote the adoption of improved land cultivation methods by smallholders on customary SNL.

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Introduction

Apart from using tractors for land cultivation, Swazi farmers have been using draught animals (mainly oxen) for many years. Animal traction was initially introduced as an alternative to hand hoes to boost the production of crops while the adoption of improved technology was still at an early stage (Shields et al., 1993). Farm power in African agriculture, especially in Sub-Saharan Africa (SSA), relies to a larger extent on human muscle power, as it is based on operations that depend on hand tools (Mrabet, 2002). However, such tools have implicit limitations in terms of energy and operational output. The use of hand hoes and animal draught power may not be suitable for a country like Swaziland where constraints such as human health problems, particularly HIV/AIDS, and demographic shifts make manual labour a scarce and weak resource (Muwanga, 2002). As a consequence of HIV-related morbidity and mortality, 38.5% of rural households have reduced their area under cultivation, 42% have experienced a change in cropping patterns and 47% a decline in crop yield. In addition, 31% have

experienced a diversion of labour to take care of the sick while 39% have experienced a loss of off-farm income (Food and Agriculture Organisation/World Food Programme (FAO/WFP), 2007).

While tractors began to be used by native Africans from around 1945 (Pingali, 2007), this technology was introduced in Swaziland in 1971 through a government initiative known as the Rural Development Area Programme (RDAP) (Funnell, 1982). In line with the national policy of food self-sufficiency (Terry and Ryder, 2007), the aim of the RDAP was to raise the level of food production and consumption for rural households. Prompted by concerns that (1) land tillage was poorly done by farmers on customary Swazi Nation Land (SNL); (2) oxen could not be used on time due to their weakness soon after the winter season, resulting in late planting; and (3) farmers needed knowledge on how best crop production could be achieved with the use of mechanical power, a tractorisation programme was introduced as one of the key components of the RDAP (Government of Swaziland (GoS), 1993). Although the tractorisation programme was initiated for demonstration purposes, the government, prompted by the benefits of the technology, opted to provide this service to customary SNL farmers who could not afford to pay for services provided by the private sector (GoS, 1993). This inadvertently led to the establishment of the Tractor Hire Service (THS), which has hire pools in 20 centres. More than 95% of the 233

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tractors in these centres were supplied by the Japanese government under the 2KR programme¹ (GoS, 2005). Tractors available in these centres are of the medium-size conventional type (40–80 horsepower), the category recommended for local conditions (see FAO, 1981). Despite such assistance, the number of tractors is still very low as farmers from customary SNL still experience delayed soil tilling and often complain that tractors are not available when required (GoS, 2007).

The Swaziland government has realised that managing the THS is not economical, as its subsidisation can no longer be sustained by already constrained public resources. Government hire charges, in nominal terms, have remained unchanged for a number of years and besides being about 48% below charges from the private sector, they are far below 'break-even' charges (African Development Bank (ADB), 1989; GoS, 2005). Government tractors charge 130 Emalangeni² (E) per hour, whereas private operators charge on average E250 per hour. The inability of the government to finance the regular service, procurement of fuel, and permanent employment for tractor operators has negatively affected the sustainability of the programme and food production in the rural areas (GoS, 2007). It is against this background that the National Agriculture Summit in 2007 called for the privatisation of the THS to try and provide farmers with the best service as and when required (GoS, 2007). While the call for privatising the THS holds, the Ministry of Agriculture is also expected to develop and implement a programme for promoting the use of animal traction as a strategy to reduce agricultural production costs. The animal traction programme is a regional initiative that emanates from the 2004 Southern African Development Community (SADC) declaration on agriculture and food security (SADC, 2004).

In order to develop a strategy that will synchronise both the use of tractors and animal draught, it is important that programme implementers in Swaziland first identify factors that influence farmers' decisions to use alternative technologies for land cultivation. Although various methodologies have been applied in past studies, a review of the literature shows three key factors that influence farmers' choices between tractors and animal draught power; household income or wealth (e.g., Low, 1986; Pingali et al., 1987; Williams, 1997), size of cultivated land (e.g., Akinola, 1987; Shields et al., 1993; Van den Berg et al., 2007) and the number of draught animals owned by the household (e.g., Mbata, 2001). Establishing the economic role of these factors in the Swaziland context would enable policy makers to decide which types of farmers to target for either tractorisation or use of draught animals.

The objective of this study, therefore, is to examine the factors that influence the choice of cultivation methods by smallholder farmers on customary SNL, using maize as a reference crop. Maize is Swaziland's staple crop and is produced by over 90% of smallholder farmers (Food, Agriculture and Natural Resource Policy Analysis Network (FANRPAN), 2003; Terry, 2007). The importance of maize to the livelihoods of rural producers in Swaziland is highlighted in Rauniyar and Goode (1996), while Peter et al. (2008) noted that apart from sugarcane, which is produced in large areas through farmer associations, individual farmers on SNL in the Komati Downstream Development Project (KDDP) produce maize as their main household agricultural enterprise. Hence, this study is based on farmers located in the KDDP, which falls within the Lowveld, one of Swaziland's driest and poorest agro-ecological zones (FAO, 2008).

¹ This is a grant assistance programme provided by the Government of Japan to developing countries. The 2KR programme was started in 1977 with the purpose of assisting underprivileged small-scale farmers improve food production by providing agricultural machinery.

² "E" denotes Emalangeni, the Swaziland currency. 1US\$=E8.31 in 1st October 2012 (Central Bank of Swaziland, 2012).

The Swaziland government commissioned the KDDP in 1999 as an innovative development intervention aimed at increasing rural living standards, using water from Maguga dam.

A socio-economic survey conducted in 2009 (Swaziland Water and Agricultural Development Enterprise (SWADE), 2009) indicated that farmers in the KDDP use tractors, draught animals or hand hoes as alternative means of land cultivation. Apart from Low (1986) and Shields et al. (1993), who studied factors that influence the use of tractors as opposed to oxen in Swaziland, to the authors' knowledge, no empirical study has been conducted which considers the use of hand hoes as a third alternative means of land cultivation in Swaziland. More importantly, these studies did not make recommendations to address the current research problem. This study also differs from previous research (e.g., Akinola, 1987; Mbata, 2001) by focusing on farmers who produce irrigated and non-irrigated maize.

The KDDP farmers are not the only smallholder farmers in Swaziland affected by major investment made by the government to try and improve rural livelihoods and food security through irrigated farming (Atkins, 1999; Terry and Ryder, 2007). For instance, Lavumisa and Siphofaneni are among other rural areas where farmers have an option to produce irrigated maize and other crops. Development in Siphofaneni is currently the largest investment covering 11,500 ha of irrigated land, which is almost twice the size of KDDP. Although sugarcane is the main crop produced in these areas (through farmer associations), part of the land is still used by individual households just like in any other rural setting on SNL to produce food crops (Peter, 2011). With more resources being committed towards expanding smallholder irrigation agriculture in Swaziland, and the Southern African region at large (see SADC, 2009, 2010), it would be remiss of current researchers to make policy recommendations without considering such developments. For this reason, the lessons drawn from this study may not only apply to the Swaziland situation, but the Southern African region at large where similar irrigation projects are being implemented.

The rest of the paper is organised as follows: The next section discusses the land tenure system in Swaziland, followed by a review of the literature related to land cultivation technology adoption. The third section presents the methodology, which outlines the sampling method, data collection procedure and empirical model. Empirical results are presented thereafter followed by conclusions and policy recommendations.

Land tenure system in Swaziland

Past studies (e.g., Feder and Onchan, 1987; Smith, 2004; Deininger and Jin, 2006) have shown that property rights which govern the use of a particular plot of land affect farmers' adoption and subsequent use of different technologies on that land. This section presents an overview of the land tenure system in Swaziland, highlighting the distinctive attributes of customary SNL compared to other forms of tenure.

The present land tenure system in Swaziland has been shaped by national decisions made since 1875 (see Simelane, 1991; Mhlanga et al., 1998). While there is considerable evidence that the land tenure system has a substantial impact on the ability of rural-based smallholder farmers to increase agricultural production, no meaningful efforts have been invested in the task of providing solutions (Hughes, 1962; Mkhabela, 2006). Attempts to formulate a national land policy, which began in 1993, have not yielded results thus far, implying that agricultural problems linked to the land tenure system will continue. Table 1 shows that the land tenure system in Swaziland is characterised by three main types; Title Deed Land (TDL); SNL and Crown land. The TDL, which accounts for about 25%, can be held by freehold or concession. However, since the

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