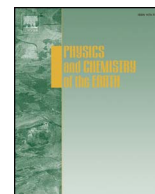




Contents lists available at ScienceDirect

## Physics and Chemistry of the Earth

journal homepage: [www.elsevier.com/locate/pce](http://www.elsevier.com/locate/pce)

## Key attributes of agricultural innovations in semi-arid smallholder farming systems in south-west Zimbabwe

Eness P. Mutsvangwa-Sammie<sup>a,\*</sup>, Emmanuel Manzungu<sup>a</sup>, Shephard Siziba<sup>b</sup><sup>a</sup> Department of Soil Science and Agricultural Engineering, Faculty of Agriculture, University of Zimbabwe, P.O. Box 167, Mt Pleasant, Harare, Zimbabwe<sup>b</sup> Department of Agricultural Economics and Extension, Faculty of Agriculture, University of Zimbabwe, P.O. Box 167, Mt Pleasant, Harare, Zimbabwe

## ARTICLE INFO

## Keywords:

Agricultural innovations  
 Conceptualization  
 Design  
 Implementation  
 Smallholder farming systems  
 Zimbabwe

## ABSTRACT

In Sub-Saharan Africa, which includes Zimbabwe, about 80% of the population depends on agriculture for subsistence, employment and income. Agricultural production and productivity are, however, low. This has been attributed to a lack of appropriate innovations despite the huge investments that have been made to promote 'innovations' as a means to safeguarding agriculture-based livelihoods, which raises the question of how innovations are conceptualized, designed and implemented. This paper explores the key attributes of agricultural innovations by assessing how innovations are conceptualized, designed and implemented in semi-arid smallholder farming systems in south-west Zimbabwe. The study gathered information from 13 key informants and a household survey of 239 farmer households from Gwanda and Insiza districts. Results showed a multiplicity of understandings of agricultural innovations among different stakeholders. However, novelty/newness, utility and adaptability were identified as the major attributes. In general, farmers characterized agricultural innovations as 'something new and mostly introduced by NGOs' but did not associate them with the key attributes of utility and adaptability. More crop-related innovations were identified despite the area being suitable for livestock production. The paper concludes that, rather than view the multiple and sometimes competing understandings of agricultural innovations as undesirable, this should be used to promote context specific innovations which stand a better chance of enhancing agriculture-based livelihoods.

## 1. Introduction

Innovations are generally regarded as critical to the socio-economic development of any society (Esparcia, 2013) as they contribute to industry, business and economic growth (Godin, 2008). They are seen as bringing about efficiency, productivity, quality, and competitiveness (Bessant et al., 2005; Bareghen et al., 2009). Innovations are also important in the agriculture sector, especially in developing countries where the sector makes a significant contribution to the social and economic development of nation states and to the livelihoods of the majority of the population (World Bank, 2008). This is particularly true for Zimbabwe and the rest of Sub-Saharan Africa (SSA), where about 80% of the population depends on agriculture for subsistence, employment and income (World Bank, 2008; UNDP, 2012).<sup>1</sup> However, agricultural production and productivity, remain low due to a plethora of challenges including frequent droughts, poor soil fertility (worsened by low levels of fertilizer use), poor institutional coordination and poor adoption of agricultural innovations, which result in widespread food

insecurity (Hazell, 2005; Van der Zaag, 2010; Diao et al., 2010). The main challenge relates to a lack of clarity regarding the conceptualization, design and implementation of agricultural innovations (Tenywa et al., 2011).

Conceptualization is the process whereby fuzzy and imprecise concepts are made more specific, and involves taking a broad idea and packaging it into smaller and clearer components (Blackstone, 2012). Appropriate conceptualization can help to shed light on issues that need to be considered when studying agricultural innovations from both a theoretical and practical viewpoints (Real and Poole, 2005). Design involves solving problems, creating something new or transforming less desirable situations into preferred situations (Friedman, 2003) and requires an understanding of how things work and why. Thus, design is a process that is goal oriented, as it focuses on solving problems by meeting the needs, improving situations, or creating something new or useful (Friedman, 2003). In the context of this paper, we refer to more social than technical design although social design contains technical aspects. How an innovation is designed raises questions about the

\* Corresponding author.

E-mail address: [enesspm@gmail.com](mailto:enesspm@gmail.com) (E.P. Mutsvangwa-Sammie).<sup>1</sup> It is, however, important to underline the fact that this varies from country to country. For example, agriculture contribute about 30% to Gross Domestic Product (GDP) to Malawi while in South Africa it accounts for as little as 3% (2011; UNDP, 2012).<https://doi.org/10.1016/j.pce.2018.03.001>Received 28 April 2016; Received in revised form 29 March 2017; Accepted 1 March 2018  
1474-7065/ © 2018 Published by Elsevier Ltd.

**Table 1**  
Definitions and key attributes of innovations.

Definition	Attribute
1. Use of new ideas, technologies or ways of doing things, in a place where people have not used them before (Barnett, 2005).	Novelty
2. Successful combination of new hardware (technical devices and practises), software (knowledge and modes of thinking) and “orgware” (social institutions and forms of organizations) (Smits, 2002).	Novelty
3. Working with and reworking the existing stock of knowledge in a novel way (Arnold and Bell, 2001).	Novelty, Adaptation
4. Something new in terms of its origination or reworking/repackaging (Read, 2000).	Novelty, Adaptation
5. Search for development, adaptation, imitation and putting into use technologies and methodologies that are new to a specific context and have social and economic significance (Hall, 2009).	Novelty, Adaptation, Utility
6. Process in which all types of knowledge (not just scientific knowledge and technology) are applied to achieve desired social and economic use (Daane et al., 2009).	Utility
7. Any new idea or approach that is applied in fundamentally different ways to create value for the different stakeholders (Lee et al., 2012).	Novelty, Utility
8. Application of technological, institutional and human resource and discoveries to productive processes, resulting in new practices, products, markets, institutions and organizations that are improved and efficiency-enhancing (Smits, 2002; Van der Ploeg and Bouma, 2004; Poole and Buckley, 2006)	Novelty, Utility
9. Any knowledge (new or existing) introduced into and used in an economically or socially relevant process (Spielman et al., 2008).	Novelty, Utility

implementation of that innovation. Implementation is defined as the process of putting ideas, designs and visions to work (Real and Poole, 2005). It is during implementation that stakeholders adopt/adapt innovations for various reasons, and this may have profound implications for the conceptualization and design stages.

Clarifying how agricultural innovations are conceptualized, designed and implemented, is not easy because different stakeholders (such as extensionists and researchers of different persuasions) tend to have different perspectives (Garcia and Calantone, 2002; Damanpour and Schneider, 2006). The result has been a proliferation of innovation-related terms that are ambiguous and cannot easily be measured (Adams et al., 2006). This has been worsened by elements of window dressing where innovation is used as a catch phrase or fashion statement (Chambers, 2009). Adding to the complexity is the ever-evolving definition of innovation (World Bank, 2006).

In this paper, we focus on the way agricultural innovations are conceptualized, designed and implemented in semi-arid smallholder farming systems of south west Zimbabwe in ward 5 and 17 of Gwanda district and ward 4 and 17 of Insiza district. The objectives of the study included: 1) characterizing the meaning and scope of agricultural innovations by various stakeholders, 2) exploring how the opinions held by the stakeholders can be theoretically understood and practically implemented, and 3) drawing conclusions/implications about how local understanding of innovations leads to adoption, adaptation and of innovations, which has consequences for sustainable agriculture-based livelihoods.

## 2. Theoretical overview: scope and attributes of agricultural innovations

### 2.1. Origin of agricultural innovations

The origin of innovation in agriculture can be traced to two phases/approaches: (i) the informal systems of experimentation and selection, and (ii) the formal research and development (R&D). The informal system occurred through a process of natural plant (and animal) selection and human purposive selection. This included unorganized activity of producers as well as uncontrolled and unsystematic transfer of technology arising from human migration and trade (Biggs and Clay, 1981; Lipton, 2005). It was mostly developed by farmers and is believed to have occurred over many years, mainly through chance and informal action. It nevertheless contributed significantly to improving agricultural production and productivity and agriculture-based livelihoods (Poole and Buckley, 2006). This explains the increasing interest among many researchers of the role that indigenous knowledge can contribute towards agricultural development as it is seen as capable of providing a crucial foundation for community-based innovation that has potential to sustain households, communities and nations (World Bank, 2006).

There is, however, a contrary view that sees indigenous knowledge as lacking objectivity and authority when juxtaposed to scientific knowledge (Poole and Buckley, 2006). For this and other reasons, the system has largely been replaced by the formal research system.

The formal ‘research and development’ (R&D) systems, that were mostly part of national and international public sector organizations (Lipton, 2005), got a foothold through the formal application of scientific methods in the relatively advanced economies, and during the Industrial Revolution in the 18th and 19th centuries (Poole and Buckley, 2006; Anandajayasekeram, 2011). A partnership of public sector and private charitable organizations resulted in the development of formal national research systems and formation of international organizations such as those that make up the Consultative Group on International Agricultural Research (CGIAR) system (Biggs, 1990). Formalization of agricultural R&D in developing countries was boosted by the massive investments of the Rockefeller and Ford Foundations which led to the Green Revolution (Ngambeki, 2003; Ram et al., 2012). This involved the transfer of genetic material during the Green Revolution leading to the development and dissemination of high yielding crop varieties, which was a success in Asia and Americas but not in Africa (Poole and Buckley, 2006).

### 2.2. Definition and attributes of innovations

By definition, all innovations have an element of novelty/newness in that they are different from what existed before (Garcia and Calantone, 2002), and refer to new things being done or old things being done in new ways (Poole and Buckley, 2006; Anandajayasekeram, 2011). Rogers (2003) defined an innovation as an idea, practice or object that is perceived as new by an individual or group of people. He further went to say that, “the perceived newness of the idea for the individual determines his or her reaction to it and if an idea seems new to the individual, it is an innovation”. Apart from novelty, innovations are also associated with utility; they are supposed to yield some benefit or have some utility to society (Schulz, 2008; Daane et al., 2009). An analysis of various definitions from literature shows that there are basically three key attributes that characterize innovations, namely novelty, adaptation and utility (Table 1).

By far, interest in innovations is driven by the perception of their utility, with reference to financial, economic or social gains accruing to society. For example, innovations are promoted on the basis that they will increase yields, reduce costs of production, enhance quality, reduce risk and increase environment protection (Sunding and Zilberman, 2001). Thus, innovation refers not just to research outputs, but to research outcomes that are usable by society. In the words used by Bennet and Bennet (2008), “research/innovation converts money into knowledge and innovation converts knowledge into money”.

It is however important to underline that assigning utility of an

Download English Version:

<https://daneshyari.com/en/article/8912345>

Download Persian Version:

<https://daneshyari.com/article/8912345>

[Daneshyari.com](https://daneshyari.com)