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RESEARCH ARTICLE

TREND ANALYSIS OF TECHNOLOGICAL AND AGRICULTURAL ECONOMIC GROWTH IN NEPAL

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ABSTRACT

The trend of agricultural technologies and agricultural value-added growth based on time series data of Nepal over the period 2001–2018 has been examined in this paper. The technological progress plays a major role in enhancing the potential productivity of land and affecting the economic growth positively. The results indicated that there are some benefits from the utilization of a system of technological innovations including mechanization. It was found that technological innovations pertaining to soil conditions, irrigation systems and chemical fertilizers might be beneficial to agricultural production growth in the long-term when they are managed in accordance with soil characteristics and in a balanced way. Thus, it is recommended that Nepal makes a large scale investment in agriculture and carry on renewal at opportune moments so as to keep steady the positive trend of the agricultural growth over the years. The investment may be in terms of mechanized technologies, supporting infrastructure and appropriating the knowledge relating to their management; and adopting new farming technologies and practices involving crop rotation, multi-cropping and agro-forestry so as to sustain the growth of agricultural value added.

KEYWORDS

Productivity, Technology, Value added

1. INTRODUCTION

Agriculture transformation remains one of the Nepal's top most priorities but has difficult to achieve. Adoption of new technology is the key to change subsistence agriculture to commercial nature. The ratio between farmers and technology adoption is wide in Nepal as a result technology dissemination and adoption have increasingly become difficult. Nepal should come up with functional, pragmatic and implementable agriculture plan and policy to harness huge possibility of agriculture commercialization to meet the consumption demand within and outside the country. Crop technologies that enhance productivity can be an alternative for rural farmers to escape hunger and food insecurity by enhancing production, reducing food price and making food more accessible to the poor. Furthermore, Technology adoption decision is conditional on farmer's perception on the performance of new technology. Research and extension should involve farmers more in the technology development process, specifically to investigate the causes of the 'adoption gap' for maximizing production of farm.

Most people having financial ability also aren't interested in farming with new technologies in their own land. They prefer to spend the money to buy commodities rather than producing. Various Evidences show that nearly 70% of the remittance is spent for agriculture commodities which have high potentiality to produce within the country even after local consumption (Paudel, 2018). The dominant reasons for not trying a technology were related to constraints internal to the farming system (typically lack of labor or land). Unavailability of information/inputs needed to use the technology, or technical problems; typically, difficulties of handling the technology or its incompatibility with the farming system were less important.

In recent years, Evidence has proved that technology has supported and accelerated economic growth in agriculture. Various input factors have their own influences on agricultural production. For instance, while the Integrated Pest Management (IPM) seeks to use pesticides when other options are ineffective (Bale, van, & Bigler, 2008), the Integrated Nutrients Management (INM) recommends to balance both organic and inorganic fertilizers (Goulding, 2008) for a green production. Actually, owing to some serious concerns, sustaining the agricultural production growth and yields requires nowadays the application of Fertilizer Best Management Practice (Robert, 2007) as a key technological innovation, in the regions that are more dependent on agriculture and have substantial employment and income arising from subsistence farming. Therefore, adoption of particular technology is considered or the most critical factors in the success or failure of agriculture production. The adoption is defined as continued use of recommended idea or practice by individual or group over a reasonable period of time (Dasgupta, 1989). Some farmers are very quick to adopt innovations and put them into action but some farmers are slow to adopt innovation because adoption of improved agricultural practices varies from farmer to farmer according to their knowledge understanding about the technology and availability of resources (Khatik, 1997).

2. PURPOSE OF THE STUDY

This paper aims to study the trend of technologies in value addition that

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contribute towards compilation of the gross domestic product from agriculture with prominent subsistence farming to facilitate potential changes in the income structure. This background is made to examine the case of Nepal. Agriculture is the mainstay of the livelihood in Nepalese economy, providing primary occupation to about 65.6% of the total population (GoN, 2016). However, as agriculture is only a means of subsistence for the majority, the share of agriculture to the national Gross Domestic Product (GDP) is minimal, contributing just 27.10% to the total GDP (GoN, 2018). It is highly dependent on agriculture, with substantial employment and income arising from subsistence farming. It is important to investigate how the ranges of agricultural technologies like mechanization, chemical technology, management practices and policies relating to cropping, as well as other agricultural infrastructures, could improve value addition to the gross domestic product besides the common factors of production (capital stock, labor force, land area). The main issues investigated are: How are agricultural technologies linked to the agricultural production growth and what association of agricultural technologies should be deployed for sustaining the growth of the agricultural gross domestic production in Nepal.

3. Results and Discussion

This study depends on average growth rate of agricultural technologies on the growth of agricultural value-added in Nepal over the period 2001–2018. Then, an analysis is made of the response of agricultural value-added growth over time following technological innovations and the corresponding findings are put forward.

Table 1: Variable definitions and data sources

AGRIVA	Agricultural value-added (Rs million, value price 2011)	World Bank Database
MACHI	Number of tractors and power tillers used for agricultural purpose	Department of Transport management
LABOR	Agriculture employment (% of total employment)	World Bank Database
ALAND	Land for arable land and permanent crops (area in hectare)	FAOSTAT
FORES	Land for planted and naturally regenerated forest (area in hectare)	FAOSTAT
IRRIG	Land equipped for irrigation (area in hectare)	Economic survey report
FERTIL	Chemical fertilizers (nitrogen, phosphorus and potassium) consumed (quantity in tons)	Statistical Information on Agriculture
NETK	Net capital stocks value (Rs million, value price 2011)	FAOSTAT

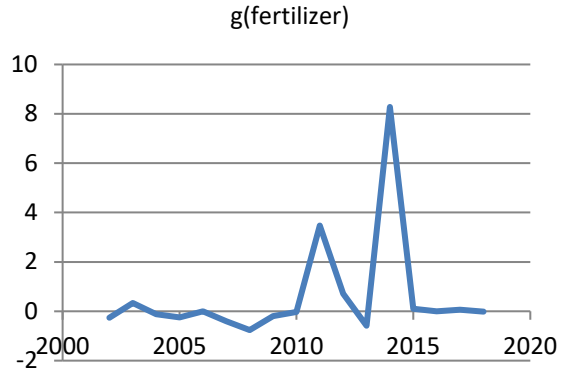


Figure 1 (a): Trends of annual growth rate of chemical fertilizers (2001–2018).

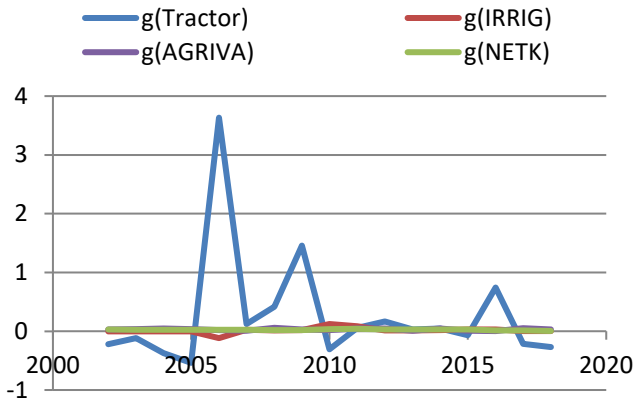
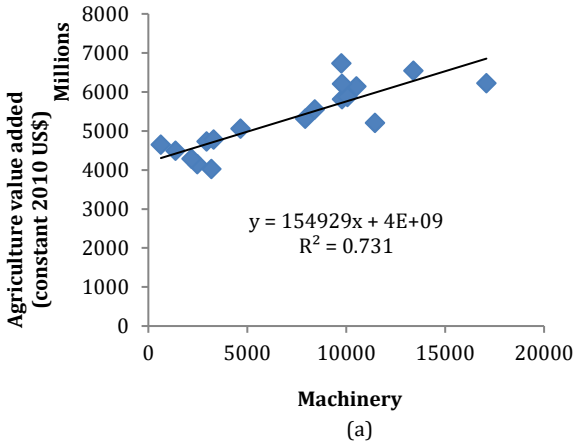
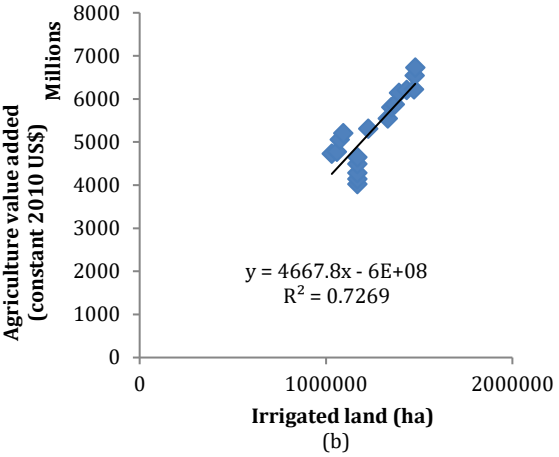


Figure 1 (b): Trends of annual growth rate of agricultural value-added, arable land and area equipped for irrigation (2001–2018).

Figure 1a and b describe the trend of the annual growth rate of variables and indicates that the evolvement of variables has not been steady over the study period. The trends depict serious fluctuations of the growth rate of agricultural technologies and as a result, an unstable growth rate of agricultural value-added. Figure 1a, present information specific to the growth rate trend of chemical fertilizers uptake from 2001 to 2018, of which the peak is attained at 8.28% in 2014. This evolvement raises some questions pertaining to the effect of chemical technologies on crop yields. However, studies have suggested that applying chemicals in a balanced ratio would be the best way to draw profit from these land-saving technologies Figure 1b shows the growth of agricultural value-added was positive throughout the period of 2001 to 2018. The highest growth rate is about 3.63 % (2006) and attained by machinery whereas the lowest growth rate is about -0.37% (2004) and also attained by machinery.



(a)



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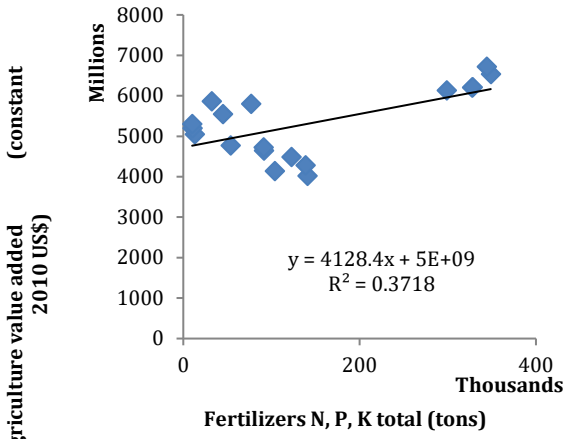
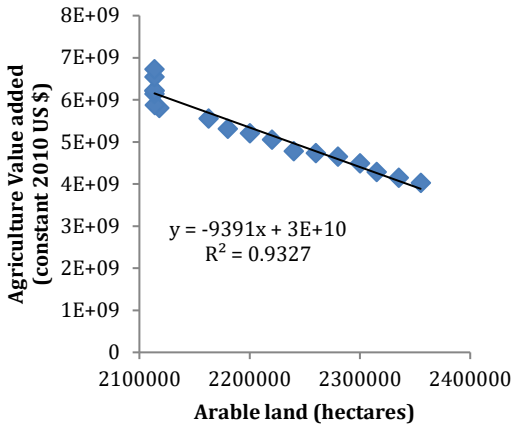


(c)



(d)

Figure 2: a and b show relationship between agricultural value added and machinery and area equipped for irrigation. c and d show relationship between agricultural value added and fertilizers and arable land and permanent crops.

Figure 2 describes the linear relation between agricultural technologies and agricultural value-added. It indicates that the number of machines used and the number of hectares equipped for irrigation are greatly related to the growth of agricultural value-added. Therefore, a linear model might explain correctly the relationship between the underlying variables, which may help to boost the growth of agricultural production in association with these underlying technologies.

Figure 2a shows relationship between machinery and agricultural value-added (2001–2018) and Fig. 2b shows relationship between area equipped for irrigations and agricultural value-added (2001–2018).

Finally Fig. 2c shows relationship between chemical fertilizers and agricultural value-added (2001-2018), whereas Fig. 2d shows relationship between arable land and permanent crops area and agricultural value-added (2001–2018).

4. Conclusions

This article examined the trend of agricultural technologies growth along with the growth of agricultural value-added based on time series data (2001–2018) for Nepal which leads to the conclusion that technological progress appears to be a major determinant of boosting the potential productivity of land and affecting positively the growth of agricultural value added in Nepal through new farming devices and practices in agriculture.

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