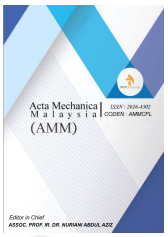
ZIBELINE INTERNATIONAL PUBLISHING

ISSN: 2616-4302 (Online)
CODEN: AMMCFL

Acta Mechanica Malaysia (AMM)

DOI: http://doi.org/10.26480/amm.01.2020.16.19



RESEARCH ARTICLE

IMPACTS OF AGRICULTURAL MECHANIZATION: A CASE OF PALPA DISTRICT OF NEPAL

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ARTICLE DETAILS

Article History:

Received 28 March 2020
Accepted 29 April 2020
Available online 13 May 2020

ABSTRACT

A study was conducted in 2019 to assess the impacts of agriculture mechanization in Palpa district of Nepal. Two hundred and twenty farmers who have been the beneficiaries of mechanization programs launched by any of the three different tiers of government and other non-governmental organizations were selected randomly by adopting snowball method and interviewed. Majority (72.3%) of the farmers of the study area were found adopting mini tiller as the result of which the bullock driven plough was found almost replaced by it. Majority (92.7 %) of the farmers had experienced increase in cost of production for first and second year and decrease in cost of production afterwards. Most of the farmers experienced increase in working efficiency and improvement in the living standard after the adoption of machines in different agriculture operations. Agriculture mechanization was found having positive impacts in productivity of agriculture products because majority (89%) of the farmers experienced increase in productivity of their agriculture products after mechanization. Assuming those farmers who did not experienced any increase in productivity of their agriculture products (11%) as 100% majority (43.5 %) of them had pointed out lack of technical skills to operate machines as the major factor responsible for it. Therefore, the concerned authorities should be focused in proper arrangements of trainings and capacity building programs for farmers to operate those machines in addition to purchase and distribution of machines for the transformation of existing traditional agriculture into commercial, modern and mechanized agriculture.

KEYWORDS

cost of production, mechanization, palpa, productivity, working efficiency.

1. INTRODUCTION

Agriculture mechanization has inductive effects to modern and commercial agriculture. In Nepal, the efforts to promote agricultural mechanization officially began in the 1960s with the introduction of four-wheel tractors (Joshi et. al., 2012). However, the promotion of agriculture mechanization had begun to take its space after the promulgation of Agriculture Mechanization Promotion Policy in 2014 arching to capture geography specific, women friendly and ecology friendly mechanization with the active involvement of three pillars of development viz. public, private and cooperatives.

According to Shrestha (2012) Nepal is in urgent need of agriculture mechanization to bring down the cost of cultivation, address the agricultural labour shortage in the villages, support intensification and commercialization in agriculture for the food security as well as for enhancing the socio economic condition of farmers in the country. Mechanization is necessary for the substantial increases in farm size (Vanden et al., 2007). Despite of the small farm size in Nepal the trend of adoption of the four-wheeler tractors is increasing (Takeshima and Liu 2018).

The New constitution of Nepal (2015) had mentioned the provision to make such policy instruments that creates a mechanized environment in agriculture sector of country by making proper arrangement of agricultural tools . Agriculture development strategy (2015) of Nepal had mentioned provision to promote mechanization in the agriculture sector of country through awareness creation, demand stimulation, concessionary financing arrangements, capacity building, and appropriate taxation.

Each coin has two sides. In the same way, agriculture mechanization has both advantages and disadvantages. According to Zhou and Lu (2012) inappropriate use of agricultural machinery may cause some damages to agricultural environment, therefore, the techniques of environment-friendly agricultural mechanization should be adopted. Similarly, agriculture mechanization causes soil compaction and stool damage result in lower yields and proportionally higher energy inputs and greenhouse gas emissions (Pryor et al.,2017).

2. MATERIALS AND METHODS

This study was conducted in 2019 in Palpa district (mid hills) of Nepal. In this study, 220 farmers who have been the beneficiaries of mechanization programs launched by any of the three different tiers of government and other non-governmental organizations were selected randomly by adopting snowball method and interviewed. The information collected were analyzed by using statistical packages for social science (SPSS) version 16.0 and Microsoft office excel 2013.

Quick Response Code	Access this article online	
	Website: www.actamechanicamalaysia.com	DOI: 10.26480/amm.01.2020.16.19

Cite the Article: Khanal Arjun Prasad (2020). Impacts Of Agricultural Mechanization: A Case Of Palpa District Of Nepal. *Acta Mechanica Malaysia, 3(1): 16-19.*

3. Result and Discussion

3.1 Present status of agriculture machines used in study area

In this study, majority of the farmers (89.5%) were found adopting light machines (Table 1) for different agriculture operations than large, heavy and advanced machines which is the clear indication that agriculture mechanization in Palpa district is still in child(immature) stage. This finding is in agreement with GC et al., (2019) where they found light machinery as an essential part of Nepali farming system. In light machines the farmers were found using chaff cutter, electric motor, Maize sheller, mini tiller, water pump and winning fan. In heavy machines the farmers were found using multi crop thresher, paddy thresher, wheat thresher and rice thresher.

Majority of the farmers of the study area (72.3%) was found adopting mini tiller as the result of which the bullock driven plough was found almost replaced by it (Figure 1). This results clearly reflects the efficient implementation of twenty years visionary document for the development of agriculture sector of Nepal i.e Agriculture Development Strategy (2015) where it had mentioned the provision for gradual increase in the numbers of mini 2-wheelers (with some optional attachments) in hilly areas like Palpa district with active involvement of private sector as one of the activities to promote mechanization in the country.

In this study, 100% of the farmers were found purchasing agriculture machines with different subsidy schemes provided by different governmental and non-governmental organizations. After the promulgation of new constitution 2015 and the transformation of unitary structure to federal structure, three tiers of government i.e. Federal, Provincial and Local are formed in Nepal. In mechanization related programs, each tier was found having their own subsidy schemes ranging from 50% to 85%. The inconsistency between the subsidy schemes provided by the different tiers of government was found creating a confusing and questionable environment for farmers. The non-governmental organizations were also found running their agriculture mechanization programs with their own schemes. In the discussion with farmers and key informants one similarity was found in operating procedures of all the concerned authorities working in the field of agriculture mechanization. All the concerned authorities were found more focused in purchasing and distributing of agriculture machineries and less focused in trainings and capacity buildings of farmers to operate those machineries.

Table 1: Adoption status of heavy machines and light machines in study area (2019)

Number of farmers in %	
Adoption of heavy machineries	10.5
Adoption of light machineries	89.5
Total	100

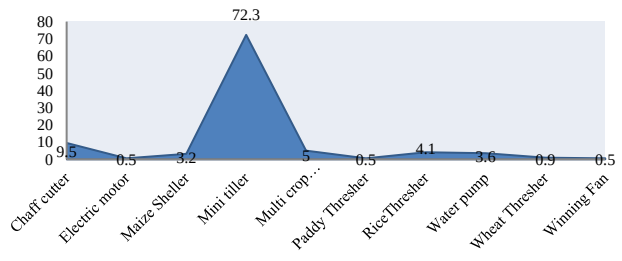

Figure 1: Adoption status of different machines in study area (2019)

3.2 Impacts of agriculture mechanization on working efficiency

In this study, majority of farmers (90.9 %) were found boosting up their working efficiency after adopting machines in different agriculture operations while 6.4 % of the farmers had said that they did not experience any changes in their working efficiency after mechanization (Figure 2). However, those farmers who were found indifferent (6.4%) and experienced decreased working efficiency (2.7 %) after mechanization themselves accepted the potentiality of mechanization and claimed that lack of technical skills to operate those machines and insufficient servicing and repairing centers as the major hurdle to improve their working efficiency through mechanization.

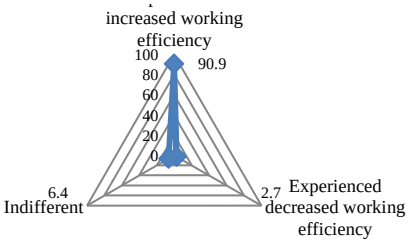

Figure 2: Farmers perception towards agriculture mechanization from working efficiency perspective (2019)

3.3 Impacts of agriculture mechanization on cost of production

In this study, majority of the farmers (92.7 %) had experienced increase in cost of production for first and second year and decrease in cost of production thereafter after the adoption of agriculture machines in different agriculture operations (Figure 3). This finding is in agreement with the study of Uprety where it was found that farmers who have introduced mechanization into their rice farming can reduce production costs by 27% and increase their profits per hectare by 36% (Uprety, 2010).

The high cost of purchasing the machines was the major cause of increase in cost of production in first and second year. The farmers provide services to others on a fee-for-service basis and earn some money to cover the initial investment which is the main reason of decreasing the cost of production after second year. According to Paudel et al., mechanization was found crucial to reduce the cost of production and accomplish timely crop establishment and other inter-cultural operations in rice (Paudel et al., 2019).

The average per unit cost of chaff cutter. electric motor, maize sheller, mini tiller, multi crop thresher, paddy thresher, rice thresher, water pump, wheat thresher and winning fan was found NRs. 42071, NRs. 53000, NRs. 20907, NRs. 94581, NRs. 337556, NRs. 165000, NRs. 337556, NRs. 39250, NRs. 307500 and NRs. 30000 respectively (Table 2).

Table 2 : Average per unit cost of different machines used in agriculture operation in study area (2019)

	Average cost in NRs.
Chaff cutter	42071
Electric motor	53000
Maize Sheller	20907
Mini tiller	94581
Multi crop Thresher	337556
Paddy Thresher	165000
Rice Thresher	337556
Water pump	39250
Wheat Thresher	307500
Winning Fan	30000

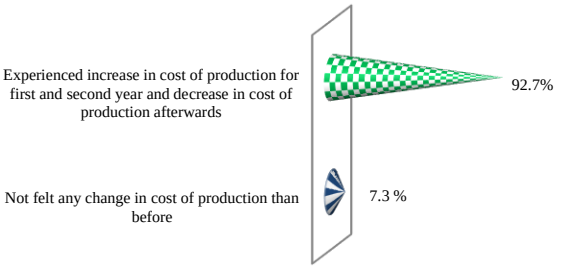

Figure 3: Farmers perception towards agriculture mechanization from

cost perspective (2019)

3.4 Impacts of agriculture mechanization on productivity of agricultural products

In this study, majority of the farmers (88.6%) experienced increase in productivity of their agriculture products after adopting machines in different agriculture operations (Table 3). This finding is in line with study by Pingali where it was found that adoption of mechanical technologies helped to enhance agricultural productivity and lowered the unit cost of crop production even in the densely populated countries of Asia. According to Yi et al., mechanization services improve farm productivity through substituting labor. Similarly, a study by Kirui had found agricultural mechanization significantly increasing the productivity of maize and rice (Pingali, 2007; Yi et al., 2019; Kirui, 2019).

Assuming those farmers who did not experience any increase in productivity of their agriculture products (11%) as 100% majority (43.5 %) of them had claimed that lack of technical skills to operate machines for different agriculture operations is the major factor responsible for it (Figure 4).

Table 3: Farmers perception towards agriculture mechanization from its role in increasing productivity of agriculture products perspective (2019)

	Number of farmers in %
Experienced increase in productivity after mechanization	88.6
Experienced no any increase in productivity after mechanization	11.4
Total	100

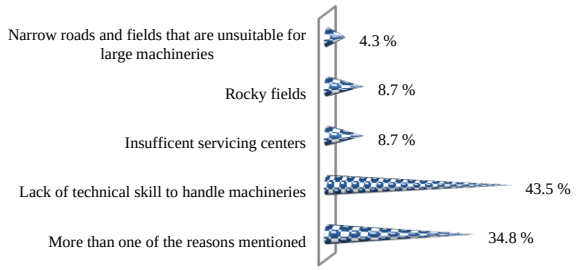

Figure 4: Factors responsible for lower productivity of agriculture products irrespective of adopting mechanization (2019)

3.5 Impacts of agriculture mechanization on living standard of people

In this study, majority (83.6 %) of the farmers had said that they had felt improvement in the living standard after adopting machines in different agriculture operations (Table 4). This finding is in consistent with Takeshima where it was found that tractor adoption has led to an approximately 17.5 percent increase in agricultural income and an 11.9 percent increase in per capita household income for medium smallholders. According to Mottaleb et al., farm mechanization is imperative in developing countries for sustainable agricultural development to ensure food security and enhance livelihoods (Takeshima, 2017; Mottaleb et al., 2017).

Agriculture is a highly laborious job but after use of machines in different agriculture operation the laborious job had transformed into a comfortable, interesting and less laborious job. Agriculture operations like tillage with bullock driven plough, shelling corns with bare hands, threshing by traditional masculine techniques, winnowing with traditional tools and so on takes lots of time and efforts but after the use of machines those operations can be done with ease and in comparatively less time. The time and efforts they save can be invested in other industrial and service oriented activities which increase their annual household income and ultimately improve the living standard of people. It is in consistent with the study by Aguilera et al. (2019) where they found that mechanization of agriculture drastically increases labour productivity in crop production, playing a major role in industrialization by freeing up workforce for industry and services.

Table 4: Farmers perception towards agriculture mechanization from improvement in living standard perspective (2019)

	Number of farmers in %
Improvement in living standard after adopting mechanization	83.6
No any improvement in living standard after mechanization	16.4
Total	100

4. Conclusion

Majority of the farmers in the study area were found adopting light and simple machines than heavy and advanced machines which is the clear reflection of agriculture mechanization of Palpa being still in its child stage and yet there is tremendous possibility of transforming existing traditional and masculine agriculture into modern, commercial and mechanized agriculture. The findings from this study clearly reveal that adoption of machines in different agriculture operations have positive impacts on working efficiency, productivity and improvement in living standard of people.

In this study it is found that just purchasing and distributing machines to farmers does not meet the spirit of agriculture mechanization. Agriculture mechanization will be complete only when the concerned authorities will be focused in proper arrangements of trainings and capacity building programs for farmers to operate those machines in addition to purchase and distribution of machines.

Acknowledgement

The author is thankful to Crop Development Officer, Government of Nepal, Mr. Suman Khanal for his constructive suggestions, respondents for their valuable time and all the helping hands for their support while conducting this research.

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