Intelligent Decision-Making Approaches for Agricultural Sectors of Odisha in India

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ABSTRACT

Agriculture lacks organizational frameworks which are needed for OHS management techniques to operate effectively. Thus, it becomes essential to analyze the magnitude of OHS problems within the agricultural sector. Hence, an attempt was made in this study to explore the prevalence of OHS disorders and discomforts among the farmers of Odisha in India. There are three contributions in this study. At first, OHS issues of farmers were analyzed based on the literature review and the data was collected by personal interaction and questionnaires. In the second part, the “Best Worst Method (BWM)” was used to rank the different rice farming processes, and the different occupational disorders and discomforts, respectively. Furthermore, the RULA tool was used to assess the ergonomics involved in various postures taken by farmers in different rice farming processes, and based on the obtained RULA scores the necessary actions were recommended accordingly. The findings in this study may have positive implications for extension programs and policy formulation in agricultural sectors.

KEYWORDS

Agriculture, BWM, Farmers, Hazards, MSDs, Odisha, OHS, Postures, RULA

1. INTRODUCTION

Agriculture plays an important role in the growth of Indian economy and it also contributes about 15% to the country’s GDP and offers employment opportunity to about 50% of its population. Rice is considered as the most common food consumed partially by the world’s seven billion people and 90% of the total worldwide rice production is consumed in Asia only. The Asian countries where rice is mostly cultivated are India, Bangladesh, China, Srilanka, Philippines, Myanmar and Vietnam. As rice cultivation requires huge amount of water which is about thrice that of maize and wheat, so it is best suited to regions with high rainfall or adequate irrigation water. Different tools and equipment meant for agricultural appliances are used in cultivation process. These tools and equipment are either manually or mechanically operated. And it has been reported by different studies that traditional tools and equipment are mostly used by the farmers.

Although there have been developments in new technologies, but there is a lack of adoption of those technologies by farmers. For instance, lack of technical assistance, non-contact by extension
agents, non-trips to field, lack of agricultural training and lack of adequate agricultural literature, were identified as the constraints for farmers (Bhatt, 2005). Jaganathan et al. (2009) have reported that the agricultural success depends upon the beneficial mindset of the farmers. Further they observed the variables such as innovativeness, mass-media exposures, self-esteem, marketplace belief, environmental orientation, cognizance and expertise confirmed a significant and positive relationship with attitude in the direction of natural farming. Tiwari et al. (2010) have found out that the adoption of zero tillage technology in Punjab was mainly due to uncooperativeness among farmers in sharing their experiences and peer community pressure. Singh et al. (2010) have reported the constraints for adoption of new technologies in rice production as lack of motivations, complexities in operational methods, lack of knowledge and awareness. Similarly, Singh and Varshney (2010) have reported that there was an average level of overall adoption of new technologies by most of the farmers, such as in weedicides application, pests & diseases management in nursery. Furthermore they have also identified the major constraints as non-availability in varieties for high yielding, expensive labor, uncertainty in the new technology, poor extension activities at the village level, and inappropriate communication systems. The present study aims to identify and explore the prevalence of occupational health and safety issues, disorders and discomfants among the farmers of Odisha in India.

1.1. Agricultural Cultivation Practices in Odisha

Rice is the commonly used food for the almost population and it covers about 69% of the cultivated area in Odisha (Das, 2012). The process of crop production includes land preparation, planting, fertilizers and pesticides application, water lifting & irrigation, weeding, harvesting, threshing, storage & transport, and other jobs. Most of the farm machinery includes manually operated tools and machines, animal drawn implements, tractor and other powered equipment. The most commonly used tools and machines by farmers for different purposes are as follows: soil tillage machine (e.g., country plough, power tiller, disc harrow, tractor operated mould board plough, and leveler), planting machines (e.g., seed drills, transplanters), cultivating machines (e.g., cultivator, weeder, rotary hoe), harvesting machines (e.g., combines, fibre crop harvesting machines, grain thresher, reapers, choppers), chemical applicators (e.g., knapsack sprayer, duster, vehicle mounted sprayer), post-harvest machines (e.g., rice huller, winnowers, chaff cutters), hand tools (e.g., sickle, hoe, spade, pick axe), and power systems (e.g., electric motors, diesel engines, pump sets).

The rice cultivation process mainly involves the following activities as illustrated below.

1.1.2. Land Preparation

Land preparation is done to provide the necessary soil conditions to enhance the successful establishment of crops. It involves digging up, mixing and leveling the soil by plowing and harrowing. While using animal driven equipment, the farmer controls and guides the implement with a handle (e.g., disc harrows and puddlers). Hand tools such as spade, shovel, and hoe are mostly used for digging and loosening the soil. Tractor power and its associated equipment are mostly preferred in the developing countries, that are mainly confined to large farms and the areas where labor costs are high. The seedbed preparation involves breaking up of hard surfaces with a plough like country/ mould board plough, tractor, power tiller implements, and then breaking down the ploughed surfaces using a cultivator or harrow, and preparation of inter-row soil to grow crops (FAO, 1990). De A & Sen RN (1986) have reported that nearly 120 man hours are required per hectares of land preparation by manual methods and the severity of seedbed preparation vary from moderate to extremely heavy in the activities like ploughing, hoeing, and bund trimming.

1.1.3. Planting Operation

This is probably the most critical phase in the cultivation process, as mistakes at this point may lead to a poor survival rate of the derived plants regardless of the efforts put in during land preparation phases. There are two main practices of establishing rice plants such as transplanting and direct seeding
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