Chapter 8
An Integrated Approach for Selection and Design of Sustainable Farmers' Protective-Hat in India

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ABSTRACT

Normally, the farmers in India are required to work in adverse climatic conditions while performing their agricultural activities. Though a number of preventive measures are available for the protection of farmers, the nominal and small scale farmers are still unable to bear these expenses. Therefore, an attempt was made in this study to the select the most appropriate material using Fuzzy-TOPSIS method to carry out the design of the head-cap for farmers in terms of parameters like stiffness, cost, durability, and availability in India. Further, for a sustainable design of these head-cap, the genetic algorithm (GA) as well as Sun Flower Optimization (SFO) method were use to obtain the best fitness values based on the anthropometric dimensions of farmers' head.

1. INTRODUCTION

A variety of hat exists for wearing in different contexts like bicycle helmets, surgical caps, fedoras, yarmulkes, and ushankas, etc. and has different inherent functions apart from providing protection. Thus an exciting opportunity is provided by this

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diversity of hats to provide the form of design in addition to hat technology creation. This paper discusses the evaluation of hat technology through proper and suitable material selection. Different literature exists regarding the protective equipment in agriculture. For instance, (Meeker et al., 2002) have explored the preventive measures as well as consistency in using protective equipment by farm women with varying levels of time commitment in farm activities in south-east Louisiana. It was found that women were less likely to wear personal protective equipment such as wearing of seat belts on tractors, wearing of boots or gloves, and hearing or breathing protection. However, no difference was found between groups for use of protective equipment such as hair holders, protection of skin, or helmets on all terrain-vehicles.

According to, Safety and health in agriculture (2011) the supplementary protection are provided by personal protective equipment in agricultural production against exposure to hazardous conditions where by other means the safety of workers cannot be ensured. For the open air workers, the bamboo as well as leaf headgear are the most indispensable items that are produced throughout the Assam State in India Saikia, (2012). (Makalew et al., 2013) have revealed that the farmer characteristics such as education level, age, family member numbers, distance with organic manure and getting in touch with instructor influenced the motivation of farmers. Throughout the world hats exist in nearly all cultures which reflect rich traditions as well as self extension over generations (Chico, 2013).

(Jazi et al., 2014) have made a computational learn of a helmeted humans head, by studying the effect of helmet pad material on the stage of accelerations, shear stresses, and inflicted pressures in a human head model subjected to a ballistic-impacts. It was found that a pad with lesser stiffness was more effective to absorb the impact energy, reduced sudden accelerations of the head, and subsequently lowers the level of brain injuries. The producers, consumers, and policymakers interests as well as the widespread belief in the effects of health benefits of organic agriculture encourages a greater resource allocations in modern society for carrying out research in this area (Aleixandre et al., 2015). (Jallow et al., 2017) have reported of 58% farmers not using of any personal protective equipment while dealing with pesticides.

Barman et al., (2017) have introduced the invent of a low cost "agro-quadcopter" module in order to receive command & send feedbacks and to react spontaneously to administer through a range of control system when working in real-time. Further it was revealed to be able of performing the study on each day -weather, each day temperature records, detection of infected crops, keeping pests away, aiding in artificial pollination, as well as spraying & seeding, thereby reducing farmers' workload and enhancing the farmers' productivity.

Dutta (2018) has discussed about losing threats of traditional knowledge systems in Assam region of North-East India due to proliferation of neo-societal norms, human

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