AKENTEN APPIAH-MENKA UNIVERSITY OF SKILLS TRAINING AND ENTREPRENEURIAL DEVELOPMENT, KUMASI

DEPARTMENT OF FASHION DESIGN AND TEXTILES EDUCATION

IMPROVED CLOTHING FOR AGRICULTURAL PRODUCTIVITY IN GHANA: A CASE STUDY OF BENSO OIL PALM PLANTATION AND GHANA RUBBER ESTATES LIMITED OF THE WESTERN REGION

JAMES TETTEH ADEMTSU

JULY, 2022

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MASTER OF PHILOSOPHY IN FASHION DESIGN AND TEXTILES

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JULY, 2022

DECLARATION

STUDENT'S DECLARATION

I, JAMES TETTEH ADEMTSU, declare that this dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE: ……

DATE: ……

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this research work was supervised in accordance with the guidelines for supervision of dissertation laid down by the Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development, Kumasi.

NAME OF SUPERVISOR: DR. DANIEL K. DANSO

SIGNATURE ……

DATE ……

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DEDICATION

This dissertation is dedicated to the Almighty God for helping me through my study. I dedicate it to my late parents in blessed memory, May God be pleased with them for given me a foundation in education.

To dedicate this thesis to my wife Mrs. Tetteh Ademtsu, daughters Sarah Love Ayerkie Tetteh and Lilylove Ayorkor Tetteh.

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ABSTRACT

Agricultural employees have permanently or temporarily been disabled by work-associated accidents due to insufficient knowledge in safety in handling equipment and machines and obeying simple procedures for achieving set tasks. Poor health and safety practices in the farming system leads to illness, accidents and low productivity. The advantages of using PPE make it possible to eliminate unnecessary accidents. But the cost of import, sales, and the quality of the protective clothing have no policy guiding its implementation in the sector simply because, the farmers are private businessmen. The study aimed at improved clothing for agricultural productivity in Ghana at Benso Oil Palm Plantation and Ghana Rubber Estates Limited. The research adopted the mixed-method research design. This pragmatic approach was a sequential exploratory design. The Population of the study consisted of all the agricultural workers between the ages of 25 to 60, engaged in farming where each worker was considered as a unit of analysis. Purposive sampling method was used and stratified random sampling was adopted for analysis and data collection for this study. The major tools for data collection were the questionnaire and interview. Results revealed that training in the use of personal protective on-farm site, quality of personal protective equipment, user-friendliness of the protective garments on farm site, protective personal equipment availability, the ease in care of the protective clothings were a factor considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The agricultural industry makes a considerable contribution to the Ghanaian economy, albeit it has recently been surpassed by the services sector. Despite this, the sector continues to employ about half of Ghana's working population (Issahaku et al., 2020). The Ghana Labour Force Survey (GLFS) Household Agricultural Module gathered information on household agricultural activities. A total of 2,203,965 households, or 25.8% of Ghanaian households, are involved in agricultural activities, with 1,690,026 houses led by men (76.7%) and 513,939 families led by women (23.3%). In urban households, 428,065 (9.0 percent) were involved in agricultural operations, with males and females leading 318,409 and 109,656 families, respectively. Nearly 47% of rural households are involved in agricultural activities, with males and females leading 1,321,429 and 402,051 homes, respectively. Ghana's agricultural activities are primarily rural (80.6 percent or 1,775,900 people), which reflects the GLSS-6 figures (82.5 percent) (Ghana Statistical Service, 2013).

The majority of farmers cultivate their crops and find markets for the products. Inadequate finances, climate change, weak pricing and marketing rewards, inadequate agricultural extension officers, pests and diseases, and lack of access to fertilizers all add to the sector's deteriorating fortunes (Adams & Jumpah, 2021). These have brought about improvising methods to create yet another success story. Yet there is always a high tendency of injury in the use of tools and equipment, hazardous chemical for spraying, weeds, pesticides and other diseases on the farms. Indeed, farm workers have been reported to drink or ingest food during spray operations (Zwane et al., 2011). This could be seen in their way of applying safety precautions in their agricultural

activities. International Organization for Standardization (ISO) (2004) maintains that Thermal resistance between the environment and body is provided by protective clothing. Its major role is to maintain a comfortable body temperature, although it might make it difficult for the body to shed extra heat in hot weather. The material's thermal insulation and its ability to transport moisture (such as perspiration and rain) through the cloth are also important considerations. Clothing can also have a pumping effect, as movement causes air to travel between the body and the fabric during work (Darfor et al., 2021).

Depending on the material used, clothing has its own inherent insulating qualities. This insulation quality is described as clothing conductivity reciprocal, which is the thermal insulation needed to have a sedentary person contented at twenty-one degrees Celsius (Ankrah Twumasi et al., 2022). Kapri and Ghimire (2020) is suggested that workers wear thin clothing in hot situations since the thickness of the material impacts its insulating properties. Porras et al. (2022) recommended that workers wear light-colored clothing in situations when they are directly exposed to the sun, as this helps to reflect sunlight. Sunburn and skin cancer increase risk can both be avoided by covering body regions with garments (Umar et al., 2021). When assessing the risk of heat-related illnesses in current thermal settings, clothing should be considered. When working in an environment that necessitates the use of protective equipment, the danger increases significantly. Protective clothing is commonly treated to resist penetration because one of the main purposes of protective clothing is to stop direct contact between harmful substances in the environment and the skin (Sangeetha et al., 2019). As a result, the clothing's vapour resistance rises, reducing the body's ability to transmit heat to the atmosphere. Steensland and Thompson (2020) recommends protective equipment usage

for many agricultural tasks for safety concerns. Chainsaw pants/chaps and hard caps, for example, are strongly advised in forest operations requiring chainsaws.

When applying pesticides, for example, protective clothing is required; in fisheries, vapour-resistant clothing usage is typical. Because it obstructs the exchange of heat with the environment, protective clothing can raise heat stress risk and is frequently seen as uncomfortable in hot conditions. Bernard and Ashley (2009) developed a clothing adjustment factor (CAF) for the wet-bulb globe temperature (WBGT) index after studying several clothing outfits. Although no CAF values for garments made exclusively for the agriculture sector have been determined, helmets and hard hats are a specific matter while functioning in hot areas since 10-30% of surplus heat metabolic is released through the skull, and headgear can limit this exchange of heat (Bhavani et al., 2020). Extra apertures or fans inside helmets have been tested in the hopes of improving ventilation. Helmets with fans need additional strength to house the required additional equipment to command the fans, rendering them inappropriate for heavy labor. Holland et al. (2002) studied forestry helmets with various ventilation designs and found that those with vents 288 mm2 in the crown had the lowest temperature and humidity within the helmet. Forest workers, on the other hand, thought that all ventilation schemes provided a similar level of comfort, according to the study.

It iss envisaged that the existing Protective Clothing are not been utilised by most farmers as labour-intensive farming is becoming more prevalent (Wadud, 2007). This was captured by Chalermphol & Shivakoti (2009) research conducted in India where 46.4% are into different areas in agriculture recorded that respondents feel the PPE are associated with some level of pain (43.7

percent), high cost (22.5 percent), time-consuming to use (14.7 percent), unavailability as required (10.8 percent), and not necessary for each event (8.47 percent) were the reasons for not using protective equipment; but farm workers should be covered from dermal exposure to pesticides. Thus, agriculture is one of the most hazardous of all industries. The human body's temperature must be kept at 37 °C, according to Mehnert et al. (2002); otherwise, internal organs will not operate properly. Food is converted into energy by the human body, but only a small portion of that energy is employed to do work. The majority of the energy in food is converted to heat, which is carried to the skin by the blood and dissipated into the environment (Lee & Kim, 2018). Sweating is the primary means of heat dissipation in a hot environment. People who aren't used to a particular climatic conditions of climate set or the labor that must be done in them might want to enhance their production of sweat by undertaking light work in those conditions for seven to nine days. Males sweat more than females, potentially making them susceptible more to stress of heat (Lundgren et al., 2013).

Farmers, particularly new farmers, might be more susceptible to stress of heat than adults. Pregnant women who are farmers may be more likely to prematurely procreate or to offspring with birth abnormalities if they are exposed to extreme heat (Weng & Black, 2015). Warm climatic circumstances alter mood and behavior, and in hotter situations, risky behavior becomes more widespread, increasing the chance of accidents. Heat stress occurs when the body's ability to disperse heat to the environment is insufficient. Because much of the job is done outside, where the weather cannot be controlled, this is a regular occurrence among agricultural employees. This study examines the effects of heat stress on the human body, the hazards it poses to health of human, the way it is measured, how it impacts productivity of labor (Gagnon & Kenny, 2012), and

the way it may be handled in agricultural (with a concentration on farming and forestry) working situations. Managers frequently overlook heat stress as an occupational hazard, leaving people to deal with this part of the workplace on their own. Heat stress has a detrimental impact on performance of workers, and severe heat stress can be deadly; but, with adequate work organization and education, it can be considerably decreased (Centers for Disease Control and Prevention, 2008).

A garment protects the farmer against very specific requirements and is it practical enough to enable the worker perform his or her job effectively as required. Nonetheless as these variables are significant, according to Taylor (2011), other matters required to be considered as cautious particularly wearability, style and comfort. Protective garments are intended to impose an important shield between dangerous items or environments and the wearer (Joel, 2007). Personal protective devices offer minimum weight and maximum comfort compatible with protective efficiency; guarantee satisfactory production from the hazards to which the employees will be uncovered; durable and does not restrict essential movements or work or objections. Moreover, according to Taylor (2011), if clothes correctly suit and do not delay wearers' willingness to perform their work, they are far less probable to suffer an expensive loss of attention or make a possibly deadly error. As a result, the study sought to assess the protective clothing on agricultural productivity in Ghana.

1.2 Statement of the Problem

In recent years some agricultural employees have permanently or temporarily been incapacitated by work-associated accidents due to insufficient knowledge safety on handling equipment and

machines and abandoning to obey simple procedures for achieving set tasks (Oden, 2014). Poor safety practices and poor health result in accidents, and illness leading to low productivity (Sarkar et al., 2012). With clients, regulators and personnel, safety policies and good health pay for themselves and boost the credibility companies have. Farming is one most challenging physical environments in which employees meet several dangers and other matters that settle their security (Rostamabadi et al., 2019). Since about 70% of farmers do manual farming using crude equipment, their means of safety is just being careful (Moradhaseli et al., 2017). A pair of trousers, sandals and long sleeves are the gears they wear making them prone to different environmental attacks like snake bites, cut by their tools, pierced by sharp stones or sticks, affected by chemicals and parasites are but a few to mention. Protective clothing or garment is the primary factor to consider to shield the farmer (Parvez & Shahriar, 2018). This may cover from the head to toe. Though research has been extensively conducted in this area, the degree of comfortability using Personal Protective Equipment (PPE) even among farmers within the catchment area of tropical West African countries has not been delved into let alone, redesigning garments with a degree of comfortability, less movement restriction, lightweight but high strength resistance.

The advantages of using PPE make it possible to eliminate unnecessary accidents (Ammad et al., 2021). But the cost of import, sales, and the quality of the protective clothing have no policy guiding its implementation in the sector simply because, the farmers are private businessmen. Only extension officers and the government are seen using such PPE even on visits or demands to solve problems on the farm (Morrish, 2017). The need to examine and for local industrialization, produce standardised safety equipment for the peculiar farmers in Ghana will enable to a greater extent, protection to the farmer and high productivity in their daily work. Because many agricultural

chores are physically taxing, the body frequently creates significant amounts of heat (Oyekale, 2018). This means that even at moderately mild temperatures, there is a risk of heat stress. This is especially true if employees are wearing protective equipment that prevents heat from dissipating (Sookhtanlou & Allahyari, 2021). In hot weather, labour productivity suffers, thus it is in employees' and employers' best interests to avoid dehydration and limit exposure of heat. Agriculture (which includes forestry and fisheries) workers are frequently subjected to warm to hot conditions of work (Adesuyi et al., 2018).

1.3 Purpose of the Study

Protective garments are frequently not worn by employees on farming sites in Ghana, which undermines their overall safety and health; anecdotal evidence also suggests that this leads to different kinds of injuries. This research centers on learning the determinants that define personal protective garments usage on farm sites at Benso Oil Palm Plantation and Ghana Rubber Estates Limited (GREL), and their availability, maintenance, quality, training, and user-friendliness in personal protective equipment usage.

1.4 Objectives of the Study

1. To find out the types of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited.
2. To discuss the factors considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers.
3. To design and produce suitable protective clothing items for Benso Oil Palm Plantation and Ghana Rubber Estates Limited.

1.5 Research Questions

The following research questions were employed to attain the study objectives. These comprise;

1. What are the types of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited?
2. What factors are considered for the selection of protective clothing by Benso Oil Palm Plantation and Ghana Rubber Estates Limited?
3. Which appropriate modified designs can be made and produced for the workers of Benso Oil Palm Plantation and Ghana Rubber Estates Limited?

1.6 Delimitation

The research concentrated on the factors that determine the use of personal protective garments on farm sites. The study was done at Benso Oil Palm Plantation and Ghana Rubber Estates Limited in the western Region of Ghana. The factors considered availability, quality, maintenance care, training, and user-friendliness in personal protective equipment usage.

1.7 Limitation

Designing the protective clothing was delayed as a result of approval from the research site.

1.8 Significance of the Study

These research findings will be useful to policymakers and the Ghanaian government since they replicate the situation on the ground in terms of PPE use in agricultural productivity. The findings of the study will be used by the government to improve farm worker safety policies. Other stakeholders, particularly the Ministry of Food and Agriculture, will use the findings to educate

farmers about the need for personal protective equipment (PPE) in the workstation. Proper administrative measures will be set up in this manner to ensure compliance with education, legislation, and government policies concerning PPE availability, utilization, and access. Such measures are required to improve and encourage the use of personal protective equipment (PPE) among employees in certain businesses to aid prevent deaths, illnesses, and injuries. The study findings likewise serve as a baseline for future research in the field.

1.9 Organization of the Study

The research is categorized into 6 chapters. The first chapter presents the problem statement, study purpose, study objectives, research questions, delimitation, limitation, study significance, and study organization. Chapter Two presents reviews of the literature on concepts, theories, and previous studies and reviews the nature of occupational hazards, health acts and occupational safety, personal protective equipment, hazardous substances, factors influencing the use of PPE, and theoretical review also reviews the types of PPEs including clothing protection, sun protective sunglasses, safety glasses, goggles, absorptive lenses, full face shields (FFS), welding shields, protective measures, cap mount earmuffs, air purifying disposable particulate masks with exhalation valve, padded cloth gloves, nitrile protective gloves, bump caps, steel toe footwear, latex/rubber footwear, reflective safety clothing, sun protective clothing, chemical-resistant coveralls and aprons, and flame-resistant clothing.

Chapter Three shows the research design, study area, sampling technique, and population, data collection instrument, research reliability and quality, data analysis, and ethical consideration. The study area was the brief about BOPP, brief about MPOHOR WASSA East District, climate, relief and drainage, vegetation, demographic characteristics, agricultural activities, cash crops, staple

food crops, major markets, and major agricultural enterprises. Chapter Four shows the study results based on the study objectives. Chapter Five discusses in detail procedures for the construction of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited. Chapter Six presents the study recommendations, conclusions, and findings.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This study focused on studying clothing for agricultural productivity at Benso Oil Palm Plantation and Ghana Rubber Estates Limited (GREL). The chapter reviews the literature on concepts and theories on the assessment of personal protective garments for agricultural productivity.

2.2 Nature of Personal Protective Equipment

Personal Protective Equipment (PPE) is to keep personnel safe from significant workplace illnesses or injuries caused by radioactive, chemical, electrical, physical, mechanical, or other threats (see Figure 2.1).

Figure 2.1: Protective clothing

Source: Researcher's field data, 2021

Personal Protective Equipment comprises many garments and devices for example safety glasses, face shields (see Plate 2.1b), safety shoes, hard hats, gloves, coveralls, respirators and earplugs (see Plate 2.2) (Occupational Safety and Health Administration, 2009).

Plate 2.1b: safety glasses

Plate 2.2: Respirators

While the majority of work-related injuries are preventable, the lack of, insufficient, or unsuitable personal protective equipment (PPE) usage remains a significant risk determinant (Torp, 2005). The PPE used frequently in farms comprise overalls, safety Slip-resistant boots, gloves, helmets, earplugs, goggles (see Plate 2.5) or face shields (see Plate 2.4) and disposal masks (see Plate 2.6).

Plate 2.3: Face shields

Plate 2.4: Earplugs

Plate 2.5: Disposal masks

Gloves guard a person against contact with allergens and irritants.

Plate 2.6: Gloves

They keep coworkers and customers safe from infection. Slip-resistant safety boots are worn to protect staffs from slippery and wet conditions, in addition to disinfectants and water usage on a regular base.

Figure 2.2: Slip-resistant safety boots 1

Figure 2.3: Slip-resistant safety boots 2

Overalls guard workers from skin irritants, and they likewise help to stop cooling of body by inhibiting air circulation over the sweat and body evaporation (see Figure 2.4).

Figure 2.4: Overalls

Source: Researcher's field data, 2021

In flour mills and bottling facilities, where noise levels can be dangerous, earplugs are routinely utilized. Employees who combine hazardous chemical compounds and dust classically wear face shields or goggles (see Figure 2.5) and respirators to avoid inhalation and splashing of dust and chemicals.

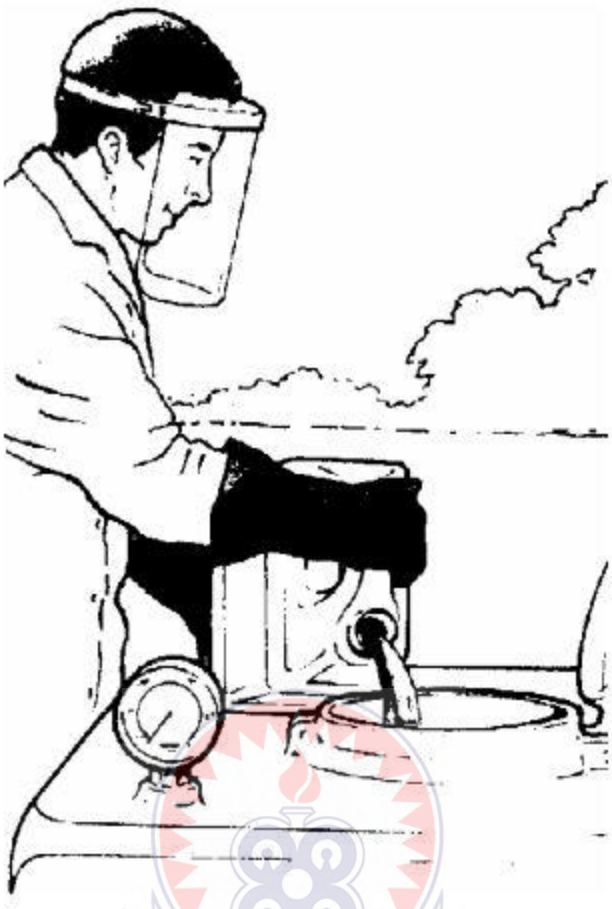


Figure 2.5: Face shields

Source: Researcher's field data, 2021

Employees who are accountable to stacking finished products ready for transportation/shipment wear safety helmets (see Figure 2.5 and Plate 2.7). Helmets are also worn by those who maintain and operate stationary or moving machines (Health and Safety Executive, 2012).

Plate 2.7: Safety helmets

2.3 Health Acts and Occupational Safety

The European directives provide basic requirements for worker protection. The most important is European Parliament's and the Council's Directive 89/391/EEC of June 12, 1989 on measures' introduction to inspire improvements in worker health and safety at work, which establishes process of risk assessment and prevention measures hierarchy that must be followed by all employers (European Agency for Safety and Health at Work, 2011). The Occupational Safety and Health Act was passed by Parliament in South Africa in 1993. (No. 85 of 1993). Employees were given extra protection under this law, as well as the employer's responsibility to create a healthy and safe workplace.

It encompasses the responsibilities and obligations of workers and employers, as well as health and safety officials' responsibilities and roles (Occupational Health and Environmental Safety Council, 2009). The implementation of the Factories Act in 1948 marked the beginning of OHS in

Kenya. To broaden the scope of the Act, it was renamed the Factories and Other Places of Work Act (FOPWA) in 1987. The Kenyan government has enacted legislation such as the OSHA of 2007, which requires companies to maintain worker safety, and the WIBA of 2007, which requires employers to bear full responsibility in the event of a workplace accident. Despite the obvious dangers in their workplace, research has found that most employees in the food processing industry do not utilize PPE effectively or reliably (International Labour Office, 2008).

2.4 Occupational Hazards

Occupational hazard, according to Smith and Keeler (2007), is a working condition that can result in death, disease, or injury. The industry hires a diverse range of people, and the dangers they face vary depending on the business. Some risks are common to the entire industry, while others are specific to a few industries.

2.4.1 Hazardous Substances

Workers may be exposed to harmful substances when engaged in farming tasks. To guard moving components and machinery from corrosion and wear, as well as to avoid high temperatures induced by lubricants, friction, greases, oils, and hydraulic fluids are required. Workers performing maintenance operations may be exposed to lubricants, which can be hazardous to their health. They can cause allergic reactions like rashes or respiratory difficulties (Lind & Nenonen, 2008). Poor maintenance can potentially compromise chemical food safety, such as food products contaminated with sanitizer or cleaner residue, pollution by tools for maintenance, rusted metal utensils, equipment, or containers, or contamination by foreign objects such as metal or glass (Krol, 2009).

2.5 Determinants influencing PPE usage

This is a major worry around the world, and various researchers have attempted to explain why compliance with PPE is so low, even in environments where there is available PPE and its usage and advantages are well understood. Comfort while wearing PPE; fogging; people had no hazard knowledge; did not reason it was essential for the job; perceived risk reduction if the job is brief; absence of supervisor/coworker influence; PPE not accessible easily from work site; poor fit; too hot; unattractive; and PPE unavailability were the reasons given in order of importance or frequently most cited (Lombardi, Ruscetti, Das, Fost, Hagen & Peterson, 2009).

2.6 Theoretical review

The main heat-radiating areas of the trunk, according to earlier studies, are the back, belly, and chest. When the temperatures of body within a protective nylon-taffeta garment were measured after a spraying-pesticide job, the temperature of the back was around 5°C higher than the temperature of the belly and chest (see Figure 2.6).

Figure 2.6: Protective clothing for pesticide-spraying

Source: Researcher's field data, 2021

This means that making the back chilly is suggested in a hot setting to increase comfort (Kim, 2013). Furthermore, according to a study report, it is vital to improving comfort by using a spare space to expand the open area to encourage ventilation and convection. Let us have a look at GIFAP's protective two-piece (top-bottom detachable) clothing, which was designed with breathability, ease of taking off/putting on, and low cost in mind. A removable kind allows for

better ventilation. It can provide maximum flexibility by permitting users to wear either item of clothing contingent on the type of chemicals and work they are exposed to. Because it can be tightened or opened at the waist, the top provides excellent ventilation.

The bottom is straight with a waistband that may be adjusted. It saves money by removing the zipper and decreasing the weight. While handling, loading, or mixing hazardous and undiluted pesticides, wear chemical-resistant clothes (see Figure 2.7).

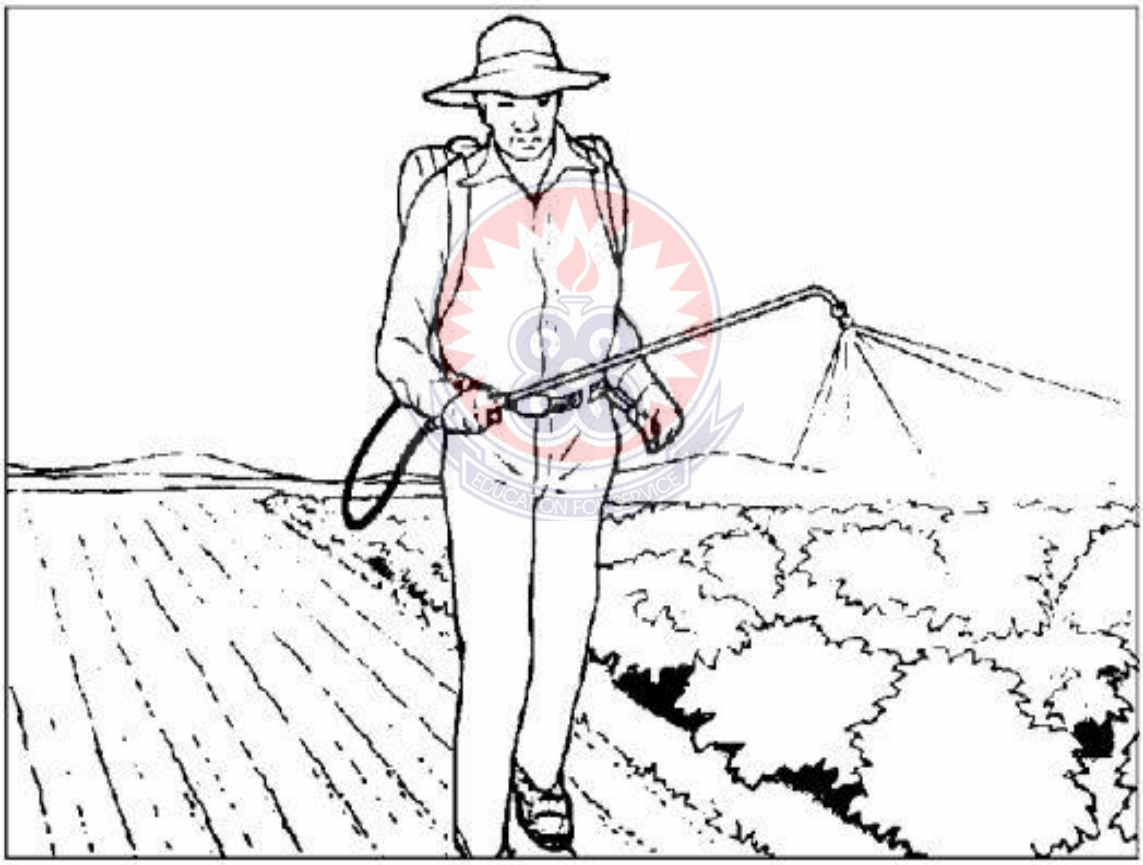


Figure 2.7: Chemical-resistant clothing

Source: Researcher's field data, 2021

Because pesticides enter the human body through the digestive, respiratory, and cutaneous systems, it is likewise necessary to wear a mask, hood, rubber gloves, safety glasses, protective clothing, and boots (Weaver, 1996; Kim, 2014). Because pesticides are easily applied to the skin, exposure of dermal is the most prevalent exposure type for applicators. Although pesticide breathing or inhalation into the lungs is less prevalent, it nevertheless poses a risk to the application (see Figure 2.8). Ingestion is rare among cautious applicators, but it does happen when people eat, drink, or smoke near pesticides or fail to wash afterward. While the forearms and hands are the most exposed, pesticides are absorbed more quickly in other regions of the body (groin, abdomen, and eyes). Many chemicals' corrosive effects can potentially cause serious harm to the eyes and skin. Following a few good work practices can greatly limit exposure.

Figure 2.8: Protective breadth clothing

Source: Researcher's field data, 2021

Furthermore, a number of agricultural scientists and medical doctors are still unsure about the health impacts of pesticide residue in agricultural workers' settings. When handling and applying pesticides, always use unlined rubber gloves. Furthermore, if spray mist is a concern, waterproof clothes may be required (see Figure 2.9).

Figure 2.9: Waterproof clothing

Source: Researcher's field data, 2021

When handling pesticides, at the very least, wear a long pants and long-sleeved shirt, splash-proof goggles, and unlined rubber boots (see Figure 2.10).

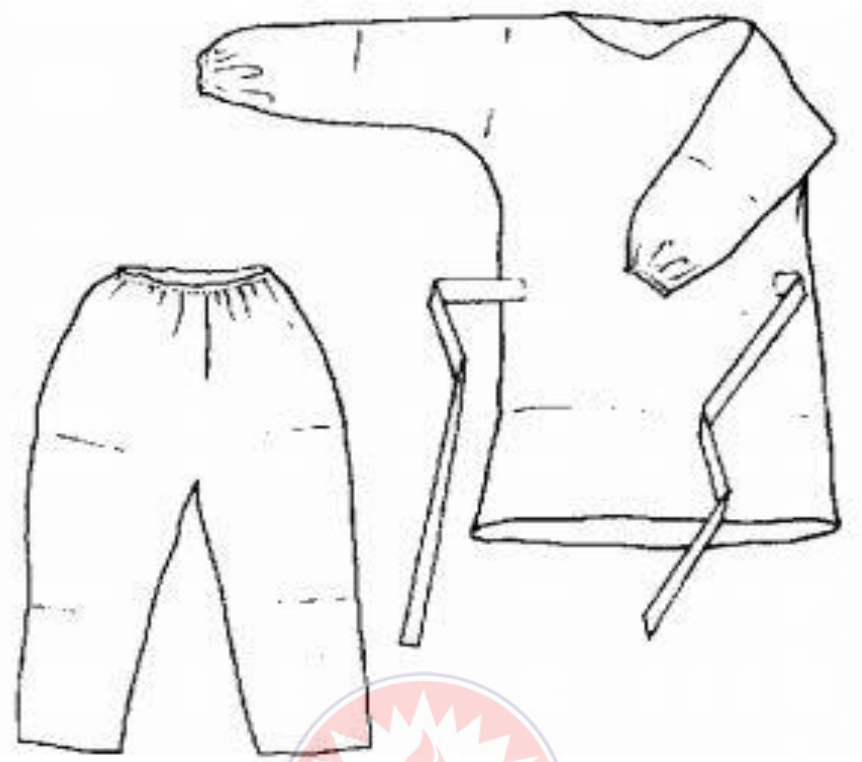


Figure 2.10: Long trousers and long sleeved shirt

Source: Researcher's field data, 2021

Farmers may also be required to wear other safety equipment, for example, a chemical respirator, according to the label. Remember that handling concentrated chemicals poses the greatest risk to the applicator (when mixing). When handling concentrates, it is recommended that you wear a rubber apron as well as the protection above (Shin & Kim, 1999) (see Figure 2.11)

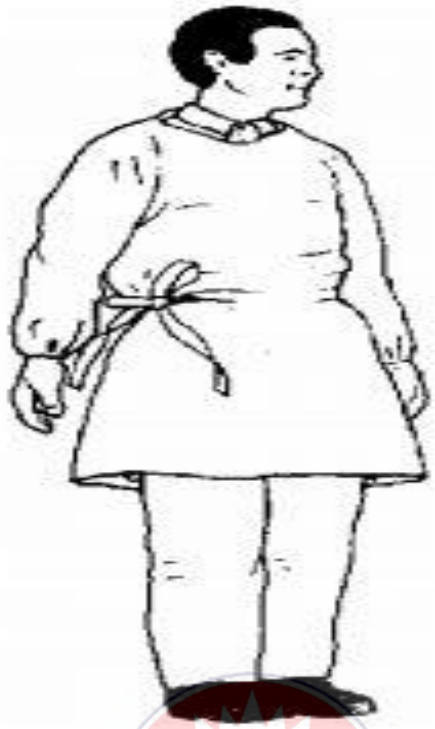


Figure 2.11: Rubber apron

Source: Researcher's field data, 2021

The ability of a chemical to damage an organ system, such as the liver or kidneys, disrupt a biochemical process, such as the blood-forming mechanism, or disturb an enzyme system at some site in the body is defined as toxicity (Zink et al., 2019). Simply said, toxicity is a chemical attribute that causes harm to a living organism's body. Various cautious statements and signal words on the pesticide label warn of acute toxicity dangers. All pesticide labels have label signal words placed prominently on the front panels. They are centered on a system that divides pesticides into groups and assigns toxicity levels to each. The LD50, or a substance lethal dosage required to kill fifty percent of the test organisms' population, is used to characterize these specific ratings (mice, rats, etc). Every chemical in your home, whether in food or as an instrument for usage around and in

the house, has a certain toxicity level. The LD50 ratings of other chemicals and numerous pesticides typically found around the home can be used to compare the acute toxicity of each while present in concentrated form. When manufacturers dilute ingredients to be traded as formed products, their ratings fluctuate, and they change even more while diluted by the user during mixing. The dire oral LD50 of some chemicals is so high that they are considered non-toxic. Chemicals with extremely low LD50 values can be extremely dangerous. Chemicals have long been suspected of being linked to birth defects, reproductive issues, and cancer. There is not much evidence that these putative side effects exist. Many critics say that there is a clear link between chemicals and long-term consequences, while others argue that the contrary is true (Whang, Kim & Lee, 2007).

2.7 Types of PPEs

2.7.1 Clothing protection

Entanglement, skin cancer, bodily harm, and pesticide exposure are all potential hazards that must be avoided. Personal Protective Equipment not only protects employees but also helps them work more efficiently. When the job and its possible hazards need it, ranchers and farmers might profit from employing the necessary protective equipment for family members, themselves, and personnel (Derafshi et al., 2017). Protective gear must be chosen with care. To ensure an appropriate and comfortable fit, test fit the protective equipment. It won't be worn if it is not comfy, and it won't protect if it isn't worn. When there is injury risk to the face or eyes from small particles, dangerous chemicals, large objects, flying particles, radiation or thermal risks, or lasers, protection of the eye should always be used (Asady et al., 2019). Different PPE must be worn contingent on

the severity and types of the hazards. These must be kept clean and clear of contaminants at all times.

2.7.2 Sun protective sunglasses

On product labels, look for UV (ultraviolet) protection. Sunglasses that block 99 to 100 percent of the sun's UV rays are the best choice. Choose larger lenses over smaller lenses, preferably wrap around lenses, to protect the sides (see Plate 2.8).

Plate 2.8: Sun protective sunglasses

Source: Researcher's field data, 2021

2.7.3 Safety glasses

For the best protection, safety glasses should impact resistant and have wrap-around lenses (see Plate 2.9).

Plate 2.9: Safety glasses

2.7.4 Goggles

Goggles provide good front and side impact protection. Chemical splash goggles, whether unvented or indirectly vented, provide protection from chemical vapors and liquids (see Plate 2.10).

Plate 2.10: Goggles

2.7.5 Absorptive lenses

For usage in safety glasses and goggles, a range of absorptive lenses are available. Absorptive lenses provide additional protection when working in bright light or with glare (see Plate 2.11).

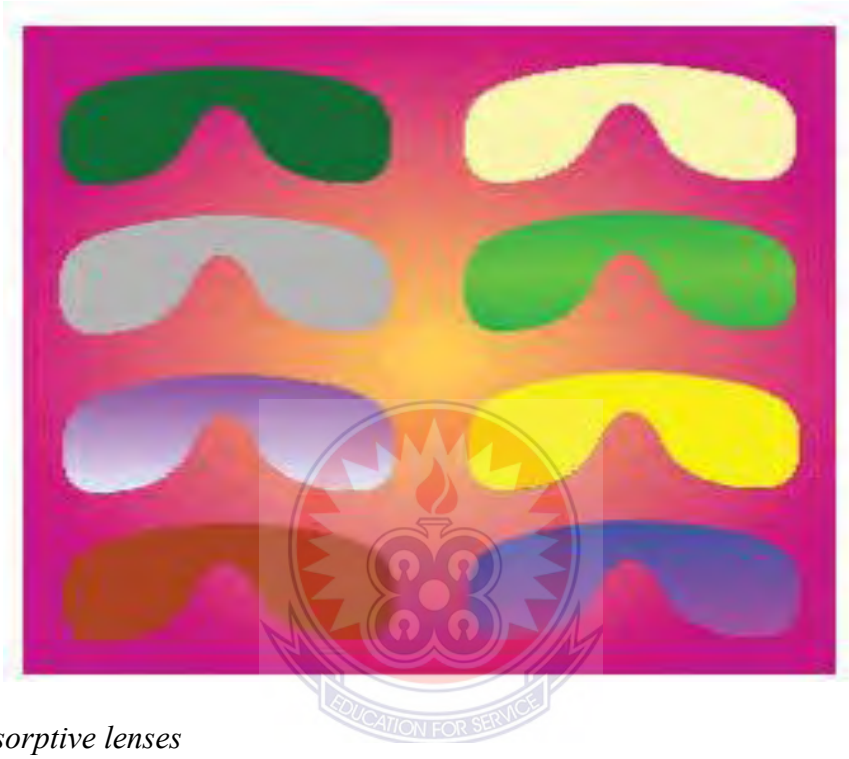


Plate 2.11: Absorptive lenses

2.7.6 Full face shields (FFS)

Full face shields are splash and dust resistant but have varying degrees of impact resistance. Underneath a face shield, wear safety glasses or goggles for complete protection (see Plate 2.12).

Plate 2.12: Full face shields (FFS)

2.7.7 Welding shields

During welding, brazing, soldering, and cutting, welding shields guard eyes from infrared or severe radiant light burns. When utilizing a welding shield, wear safety glasses or goggles (see Plate 2.13).

Plate 2.13: Welding shields

2.7.8 Protective measures

eyewash stations, machine guards, enough lighting, warning signs, adequate ventilation, and work barriers are all examples of safety measures (see Plate 2.14).

Plate 2.14: Protective measures

Source: Researcher's field data, 2021

2.7.9 Cap mount earmuffs

Attaches to a slotted safety helmet and provides simultaneous head, face, and hearing protection with the addition of a safety shield (see Plate 2.15).

Plate 2.15: Cap mount earmuffs

2.7.10 Air purifying disposable particulate masks with exhalation valve

Protects you from non-toxic liquid and solid aerosols (for example, oil mists). Breathing is easier with the exhalation valve, which also lowers hot air buildup. When a product becomes clogged, it must be abandoned (see Plate 2.16).

Plate 2.16: Air purifying disposable particulate masks with exhalation valve

2.7.11 Self-contained breathing apparatus (SCBA)

In oxygen-deficient environments, oxygen-providing respirators with an air tank are employed. Use in silos, grain storage facilities, manure pits, and during structural fumigation. Fit test is required to ensure correct fit (see Plate 2.17).

Plate 2.17: Self-contained breathing apparatus (SCBA)

Source: Researcher's field data, 2021

2.7.12 Padded cloth gloves

Hands are protected against sharp edges, slivers, dirt, and vibration with this glove. It is not appropriate to handle dangerous items in this manner (see Plate 2.18).

Plate 2.18: Padded cloth gloves

Source: Researcher's field data, 2021

2.7.13 Nitrile protective gloves

When employing a variety of pesticides, it provides enough protection (see Plate 2.19).

Plate 2.19: Nitrile protective gloves

2.7.14 Bump caps

Designed to keep your head from colliding with projecting items. Normally does not have a suspension mechanism that functions as a shock absorber inside the cap (see Plate 2.20).

Plate 2.20: Bump caps

2.7.15 Steel Toe footwear

Toes are protected from falling items and being crushed (see Plate 2.21).

Plate 2.21: Steel toe footwear

2.7.16 Latex/rubber footwear

Chemical resistant and enhanced traction on slick conditions.

Plate 2.22: Latex/rubber footwear

2.7.17 Reflective safety clothing

Wear brightly colored, highly visible apparel if you are hunting, working in a field close where hunters are present, or working near traffic (see Plate 2.23).

Plate 2.23: Reflective safety clothing

2.7.18 Sun protective clothing

Because they lack open gaps that allow UVR to pass through to your skin, tightly woven fabrics are more protective against the sun's ultraviolet radiation (UVR). Wear long-sleeved shirts, long pants, and socks when out in the sun (see Plate 2.24).

Plate 2.24: Sun protective clothing

2.7.19 Chemical-resistant coveralls and aprons

When diluting, mixing, or applying insecticides, aprons and coveralls (single use or reusable) worn over standard work attire provide added protection. For some insecticides, the labels may state that they are required (see Plate 2.25).

Plate 2.25: Chemical-resistant coveralls and aprons

2.7.20 Flame-resistant clothing

Flame resistant work clothes decreases burn harm, offers escape time, and raises the chances of survival in the unlikely case of an electric arc, flash fire, other disaster, or metal splash (see Plate 2.26).

Plate 2.26: Flame-resistant clothing

2.8 Clothing Heat Transfer Models

Heat transfer through clothing can be divided into two categories: moisture transfer and dry heat transfer. This bipartite model gives a conceptual and quantitative way for calculating heat transfer rates. The temperature difference between the environment and skin drives transfer of dry heat, which is based on heat exchange via conductive, convective, and radiant heat. Measurements with a heated flat plate or heated manikin can yield values for transfer of dry heat quantification. The intrinsic clothing insulation (Icl), which is measured in m2 °C/W, is used to quantify dry heat transfer. Theoretically, this value is independent of external factors and unique to every clothing. The transfer of dry heat model seeks to assess transfer of heat from the body to the environment through the garment layer, as well as heat transfer resistance. The air layer (Ia) thermal resistance and the overall insulation can be used to compute this value (It). The overall insulation is the sum of the garment and the boundary air layer's additional insulation.

Vapor pressure difference between the environment and skin drives moisture transfer, which is made up of evaporative heat transfer. The intrinsic evaporative resistance (Recl) and the air layer resistance to water vapor (Rea) transmission are the used parameters to quantify vapor transfer (Parsons, 2003). The evaporative intrinsic resistance measures how well vapor may pass through garments and into the environment. The evaporative intrinsic resistance and resistance of air layer to water vapor transport both have m2 kPa/W units. Clothing's evaporative resistance can obstruct thermal regulation process and reduce the amount of cooling achieved by evaporation. Other protective coverings and clothing can act as a barrier between the skin and the environment. The amount of water vapor transfer and air movement can be reduced depending on the barrier's

permeability. This has an impact on the cooling mechanisms and can diminish evaporative cooling dramatically.

2.9 Progressive Heat Stress Protocol and Critical Conditions

The progressive procedure is one way for determining the heat stress threshold. Lind proposed an experimental approach in 1960 that comprised a gradual transition to a hotter climate from a cooler, which would finally lead to heat stress (Lind, 1963). Belding & Kamon (1973), Bernard, Kenney & Balint (1986), and Kenney (1989) modified this method (1987). The prescriptive zone is defined by this protocol as a set of conditions that the body can thermally manage. The body is capable to equilibrate at these higher levels as environmental conditions steadily worsen till the upper limit of the prescriptive zone (ULPZ) is reached. The body can no longer regulate its temperature at the ULPZ, and heat storage increases. To put it another way, this is the highest level at which a person may safely do an activity (Woods et al., 2020). The critical condition is defined as the moment just before the prescriptive zone's upper limit. When evaporative maximum cooling is equalized by internal sources and net dry heat gain, the dire state is reached (Caravello, McCullough, Ashley & Bernard, 2008). The surroundings, metabolic rate, and clothing all influence the location of the critical condition. The progressive procedure comes in a variety of forms.

The first method estimates critical water vapor pressure by maintaining a steady dry bulb temperature while increasing water vapor's partial pressure in the air each 5 minutes. The second approach (Parsons, 2003) finds the crucial air temperature by maintaining water vapor's constant partial pressure in the air and raising the temperature of dry bulb each 5 minutes. The third option is to maintain constant relative humidity while increasing temperature and vapor pressure each 5

minutes. The information gathered by these approaches can be used to define dire conditions for clothing ensembles and water vapor permeability resistance (Kenney et. al. 1988). The heat stress protocol uses two crucial connections to compute total apparent evaporative resistance and total garment insulation (Kenny & Zeimen, 2002). Kenney calculated Re,T,a and It,r using data from two crucial situations (dry, hot and humid, warm) using the formulae below (Kenney, Mitika, Haveith, Puhl & Crosby, 1993).

$$\frac{P_{sk} - P_a}{R_{e,T,a}} = H_{net} + \frac{T_{db} + T_{sk}}{I_{T,r}} \quad \text{.....Equation 1}$$

$$R_{e,T,a} = \frac{P_{sk} - P_a}{H_{net} + \frac{T_{db} - T_{sk}}{I_{T,r}}} \quad \text{.....Equation 2}$$

Psk is the skin's saturated water vapor pressure in these equations. The atmosphere's saturated water vapor pressure is measured in Pa. The apparent total evaporative resistance is Re,T,a. Hnet is the body's total metabolic heat output. Tdb is the temperature of a dry bulb. Tsk is the temperature at the skin's surface, and IT,r is the total insulation that results. Using a heated manikin using the Standard Test Method for Measuring Clothing's Thermal Insulation (Lind, 1963) and adjusting for activity and air speed using ISO992018, overall insulation can be determined. Only one condition is required to solve for one unidentified in this example.

2.10 Clothing Adjustment Factors

The Clothing Adjustment Factor can be employed to analyze the impact of clothing on employees in the workplace. Bernard, Kenney, Balint, and O'Conner modified Ramsey's CAF to adjust environmental metrics once conditions require work clothing that impact storage rates of heat.

Ventilation, insulation, and evaporative resistance of the collaborative are all determinants that impact the Factors of Clothing Adjustment. The CAF is measured in degrees-WBGT, and this value is added simply to the environment's observed WBGT. The Effective Wet Bulb Globe Temperature is the product of the WBGT and the CAF (Plog & Patricia, 2002). The Effective Wet Bulb Globe Temperature can be likened to suggested levels of safe exposure from 3 sources: the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV), the NIOSH Recommended Exposure Levels (REL), and the United States Navy Physiological Heat Exposure Limit (PHEL) (Barker, Kini, & Bernard, 1999).

2.11 Conceptual Framework

Figure 13 presents the conceptual framework that aims to improve clothing for agricultural productivity in Ghana at Benso Oil Palm Plantation and Ghana Rubber Estates Limited

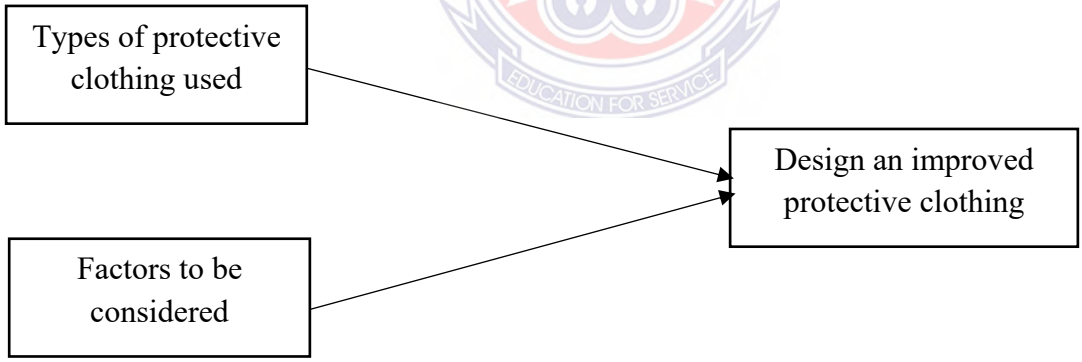


Figure 12: Conceptual framework

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The study aims to improve clothing for agricultural productivity in Ghana at Benso Oil Palm Plantation and Ghana Rubber Estates Limited. The chapter presents the research design, study area, sampling technique and population, data collection instrument, research reliability and quality, data analysis, and ethical consideration.

3.2 The Study Area

3.2.1 Brief about BOPP

Unilever Plc and the Government of Ghana (GOG) formed BOPP on January 22, 1976 as a private business limited by shares to manufacture Crude Palm Oil (CPO) and palm kernel in Ghana. The corporation was changed to a public limited liability company with 50 million authorized shares, 34.8 million of which were issued. Unilever sold its shareholding in BOPP to Wilmar Africa Limited, a Wilmar-International subsidiary, in March 2011. The corporation has over 4500 hectares of property in the Tarkwa-Nsuaem Municipality and Mpohor Wassa East District of the Western Region and is situated between two towns, Adum Banso and Benso. Benso Oil Palm Plantation primary activity is oil palm trees' cultivation and oil palm fruits' processing into palm kernels and crude palm oil. BOPP processes around hundred thousand metric tons of palm fruit each year, yielding 20,000 metric tons of crude palm oil. BOPP has a regular workforce of approximately 370 individuals and a contract workforce of approximately 2000 persons (Adu-Boahen, 2012).

3.2.2 Brief about Mpohor Wassa East District

The Mpohor Wassa East District is located in the Western Region's south-eastern corner. It is bordered on the north and south by the Central Region's Komenda Edina Eguafo Abrem and Twifo Hemang Lower Denkyira Districts, respectively. The Prestea Huni-Valley District and Tarkwa Nsueam Municipality border the district on the west and north west, respectively. Shama District, Sekondi-Takoradi Metropolis, and Ahanta West District border it on the south. The district was formed in 1988 from Wassa Fiase Mpohor District and covers an area of 1880 square kilometers (464,553 acres), with 344 square kilometers (85,000 ha) of cultivable land. Daboase, the district capital, is located 6.7 kilometers off the main road between Cape Coast and Takoradi (Ministry of Food and Agriculture, Ghana 2011). As stated by the 2021 housing and population census, the district's population consisted of 85,844 males and 77,668 females. Approximately 98 percent of farmers use traditional farming methods such as slash and burn, rudimentary agricultural implements such as hoes and cutlasses, and crops based on natural climate conditions (Ministry of Food and Agriculture, Ghana 2011).

3.3 Research philosophy

Research philosophy is a belief about how data about a phenomenon should be gathered, analysed and used (Žukauskas et al., 2018). The term epistemology (what is known to be true), as opposed to doxology (what is believed to be true), encompasses the various philosophies of the research approach. The purpose of science, then, is the process of transforming things believed into things known: doxa to episteme. Two major research philosophies have been identified in the Western tradition of science, namely positivist (sometimes called scientific) and interpretivist (also known

as antipositivist) (Dougherty et al., 2019). The study used both interpretivism and positivism paradigms since the study was mixed method.

3.3.1 Positivism

Positivists believe that reality is stable and can be observed and described from an objective viewpoint (Bowyer et al., 2021), i.e. without interfering with the phenomena being studied. They contend that phenomena should be isolated and that observations should be repeatable. This often involves the manipulation of reality with variations in only a single independent variable to identify regularities in and to form relationships between, some of the constituent elements of the social world (Missel & Birkelund, 2020).

3.3.2 Interpretivism

Interpretivism contends that only through the subjective interpretation of and intervention in reality can that reality be fully understood (Hürlimann, 2019). The study of phenomena in their natural environment is key to the interpretivism philosophy, together with the acknowledgment that scientists cannot avoid affecting those phenomena they study. They admit that there may be many interpretations of reality, but maintain that these interpretations are in themselves a part of the scientific knowledge they are pursuing (Laplane et al., 2019). Interpretivism has a tradition that is no less glorious than that of positivism, nor is it shorter

3.4 Research Design

A research design is a comprehensive plan for obtaining answers to the research questions and addressing some of the issues that may arise during the investigation (Sileyew, 2019). According to Harris (2019), a research design entails identifying a problem, selecting a sample and sampling methodologies, collecting and analyzing data, and presenting study findings. The primary goal of a research design is to ensure that the research process effectively and unambiguously addresses the evidence gathered during the research process (Abutabenjeh & Jaradat, 2018). The researcher used a mixed-methods strategy in her investigation. A sequential exploratory design was used in this pragmatic approach (Wang, 2018). At Benso Oil Palm Plantation and Ghana Rubber Estates Limited, the mixed-method approach was employed to combine qualitative and quantitative study methodologies on the protective clothing of agricultural production in Ghana. Farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited were also provided with enhanced safety clothing as part of the trial. The research looks at all aspects of agricultural activity in the subregion. As a result, local farming, commercial mechanized farming, aquaculture, and animal husbandry have been classified. It also focuses on the examination of local PPE production and garment construction agencies capable of commercializing PPEs based on national rules guiding the usage of protective clothing.

3.5 Population

The Population of the study consists of agricultural farm workers between the ages of 25 to 60, engaged in farming where each worker was considered as a unit of analysis. The total population of farmers from Benso Oil Palm Plantation and Ghana Rubber Estates Limited was 50.

3.6 Sample and sampling technique

A purposive sampling method was used for this study. As a research tool, a questionnaire survey was conducted on 50 farmers from Benso Oil Palm Plantation and Ghana Rubber Estates Limited. The researcher used all the population since the population was few. Taherdoost (2016) clarifies that the researcher aims to achieve this objective in this respect by selecting very good cases of persons, classes, organisations, or activities that have the greatest insight into the study issue.

3.7 Data Collection Instrument

The major tools for data collection were the questionnaire and interview schedule which included simple, straightforward, open and close-ended questions. The response rate of the participants through both interview and questionnaire were 100%. This study was based on the results of primary data collected through a standard questionnaire. A questionnaire survey was used to obtain data. Despite the fact that the questionnaire was structured, the study allowed interviewees to share any facts and opinions they wished with the researcher. Since the targeted population rely on sustainable protective clothing for Agricultural productivity in West Africa, the researcher counted farmers as respondents interview and questionnaire administration. To gather primary data from the chosen farmers, participant observation was used. Qu and Dumay (2011) clarify that participatory observation is a concept used more or less synonymously with fieldwork, but more precisely refers to the concepts on which the approach is based: the participant must engage and observe simultaneously. The method also entailed close monitoring of the usage of current PPE, quality management and testing systems. This helped the researcher to decide the comfort level, the climate's effects on sustainable efficiency, the cost estimation, and the productive output of the fibre twisting or spinning factor. In this case, the researcher was specifically interested in the pace

at which farmers were made available. To elicit views on the field of research, a formal interview guide was used. It asked for an explanation based on experience to better understand existing processes and methods. It also helped to analyze the actions of test participants and other potential users on the use of protective garments.

3.8 Research Reliability and Quality

The term "reliability" refers to the thesis's credibility as well as the consistency of a concept's measurement (Bolarinwa, 2015). It is critical to have a precise definition of the idea that is used throughout the interviews to boost reliability. However, since human behavior and thinking are never static, it is impossible to maintain reliability. Rather, qualitative research should try to explain and depict it in context. The goal is to demonstrate that the results are consistent with the obtained data, and researchers can employ a variety of methodologies to verify that the results are reliable (Singh, 2017). Because the classification of corporate social responsibility is relatively ambiguous and may be perceived differently, same questions relating to the subject of the matter were asked to all participants in order to assure dependability in this study. Furthermore, the topic was only briefly discussed prior to the interviews, with no important theories mentioned; this was done to prepare the participants for the interviews while avoiding any bias or potential of the answers being influenced by the researcher.

Before asking the participants, the interview template was shown to the thesis supervisor to confirm that the questions were relevant for the intended goal and that no questions were left out. No material was left out due to the usage of a tape recorder, and the researcher performed all of the interviews himself to further reduce misunderstandings and ensure that observations were not

missed. Before the interviews, relevant theories and papers on the issue were carefully researched to obtain a better understanding of the field. Furthermore, regular debates regarding the chosen issue were held to increase credibility. The final product presented in a way that improved credibility by highlighting similarities and contrasts within and across interviewee groups, as well as between interviewees. The researcher conducted transcripts and summaries of all interviews in order to offer relevant information and express it without bias. These activities were taken in order to improve the thesis's credibility and, more importantly, to enable the presentation of credible and unbiased results and conclusions.

3.9 Data analysis

The data that were collected in the study through the interview guide were analysed based on the responses of participants. Thus, participants' interview response was transcribed into words for analysis on their suggestions to help produce best clothing for your company's workers. Participants' interview response was to analyse the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited. Participants' interview response was to analyse the sustainable approaches to be adopted for the production of protective clothing suitable for farmers. Data from questionnaire were coded and edited in SPSS to analyse the types of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited and the factors considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers. The analysis was descriptive statistics on mean and standard deviation.

3.10 The Pattern Making Process

The researcher cannot ignore the review of pattern making since garments are constructed from patterns. The art of designing the outline of a plan or arrangement for sewing a cloth is known as pattern creation. It is regarded as the foundation of garment sewing. According to Liu et al. (2009), obtaining body measurements is the initial stage in pattern making for sewing clothing. When obtaining measurements for pattern making, Thomas suggests wearing normal underwear and, if you are a lady, normal pantyhose and a normal bra. Datta & Seal (2008) points out that a system of measurements and patterns allowed people to fit their bodies, particularly men's bodies, without having to resort to custom-made clothing. Han et al. (2014) also mentions the need for patterns in dressmaking in order to get a better fit and save material.

According to Aldrich and Tracy (2006), block patterns are used in the apparel industry because they are built to standard (average) measures for specific groups of individuals, but they may also be created to fit an individual body using personal measurements. Pattern making entails the design and construction of templates that can be used to make garments and craft products. Patterns are made up of pieces of paper that are traced onto the fabric to be cut, with each piece serving as a form for a certain element of the garment or item to be sewed. More skilled sewers can make their own designs at home, while pre-made patterns can be obtained for home sewing tasks (WiseGeek, 2015).

3.11 Preparation of Laying Out of Fabric and Cutting Out

a. Find a large cutting area or table large enough for the entire length of fabric if possible and prepare the cutting surface.

b. Find the correct layout for the size of patterns and the width of fabric you are using. Layout the fabric by hand matching selvage to selvage. Fabric is folded selvage to selvage to keep the lengthwise grain on the fold. The entire length of fabric can be pinned in place. Always plan the layout on the wrong side of the folded fabric with the right side together. This makes marking easy to transfer and protect the fabric from the soil as the fabric is being handled.
c. Press the patterns pieces with a dry iron to remove any creases. Layout all other pieces of grain lines first until the entire layout is complete. Pin the remaining pieces to the fabric.
d. Cut the fabric and pattern all at the same time. Use long continuous strokes to eliminate jagged edges (Marsh, Ward, & Landau*, 1999)*.

3.12 Ethical consideration

Confidentiality and privacy are two of the most critical legal issues (Gajjar, 2013). Those who will serve in the data collection process will provide the entire interviewee with all the information about the study intent. The analysis report will not use anybody's name. The security of interviewees will be assured.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Overview

The study aims to improved clothing for agricultural productivity in Ghana at Benso Oil Palm Plantation and Ghana Rubber Estates Limited. The study consists of agricultural farm workers between the ages of 25 to 60, engaged in farming where each worker was considered as a unit of analysis. A purposive sampling method was used for this study. The chapter covers the analysis and presentation of the results. It includes demographic characteristics of respondents, descriptive results, and discussion of results.

4.2 Demographic characteristics of participants (Farmers)

Farmers' demographic characteristics illustrate information about respondents of the study. These information are their company name, age, gender, and work experience. They are depicted in the figures below.

4.2.1 Name of company (Benso Oil Palm Plantation and Ghana Rubber Estates)

Figure 4.1 disclosed that 35 of the participants signifying 70% were working with Benso Oil Palm Plantation whereas 15 of the participants signifying 30% were working with Ghana Rubber Estates.

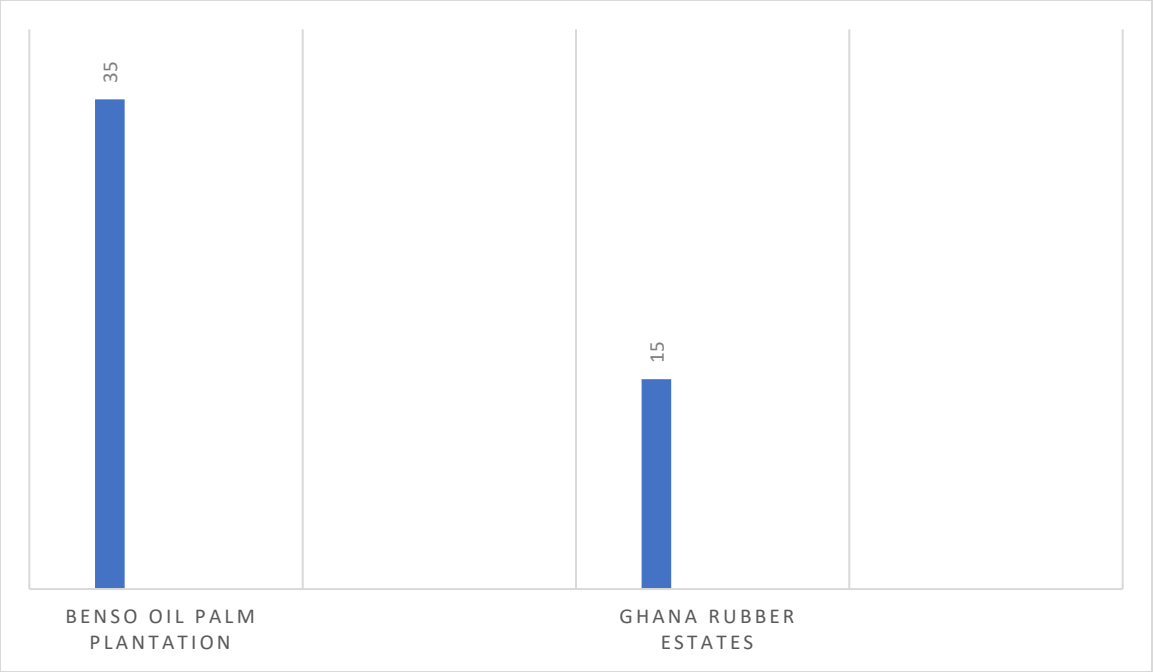


Figure 4.1: ***Name of company***

Source: Researcher's field work (2021)

4.2.2 Age

Figure 4.2 presents that nine of the participants denoting 18% were between 25 years of age and 34 years, eleven of the participants signifying 22% were 35 years of age or 44 years of age or between, twenty-five of the participants signifying 50% were 45 years of age or 54 years of age or between, and five of the participants signifying 10% were 55 years of age or 60 years of age or between. The implication of the age in this study was to analyse to age range of participants and to ensure adult who are above 18 years.

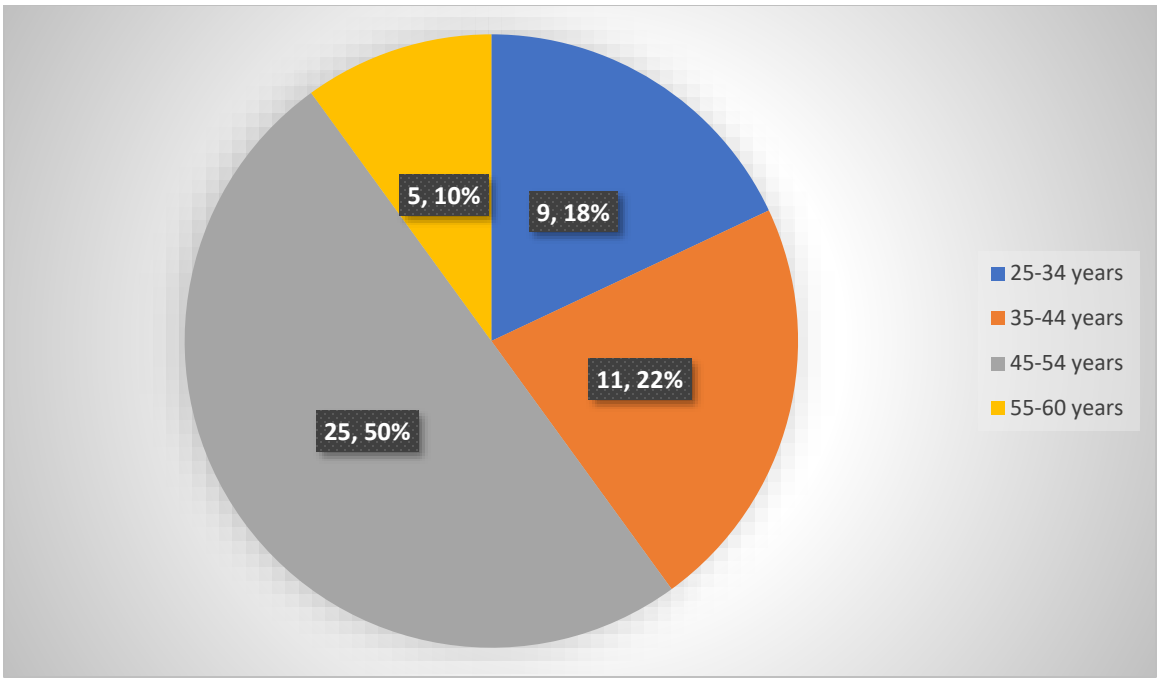


Figure 4.2: ***Age***

Source: Researcher's field work, 2021

4.2.3 Gender

Figure 4.3 shows the gender distribution of the participants. The results proved that forty of the participants signifying 80% were males whereas ten of the participants signifying 20% were females.

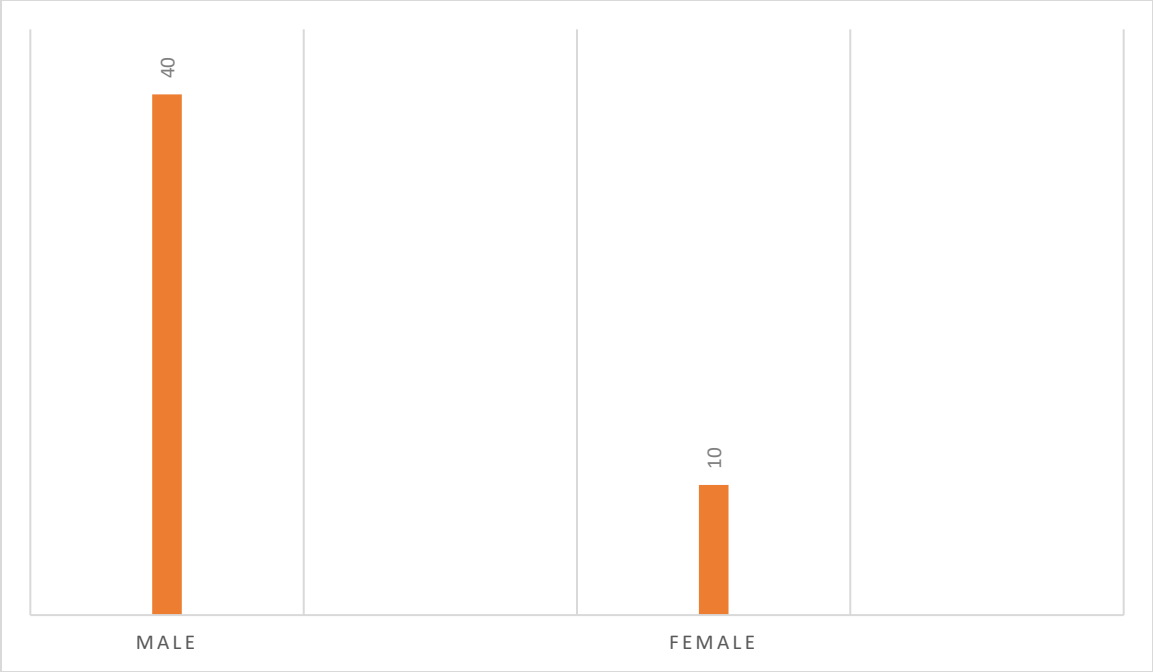


Figure 4.3: ***Gender of respondents***

Source: Researcher's field work, 2021

4.2.4 Work experience

Figure 4.4 disclosed that fourteen (14) of the participants signifying 28% had less than 10 years' work experience, thirty-one of the participants signifying 62% had 11 years' work experience or 20 years' work experience or between, five of the participants signifying 10% had 21 years' work experience or 30 years' work experience or between, and none of the participants signifying 0% had above 30 years' work experience.

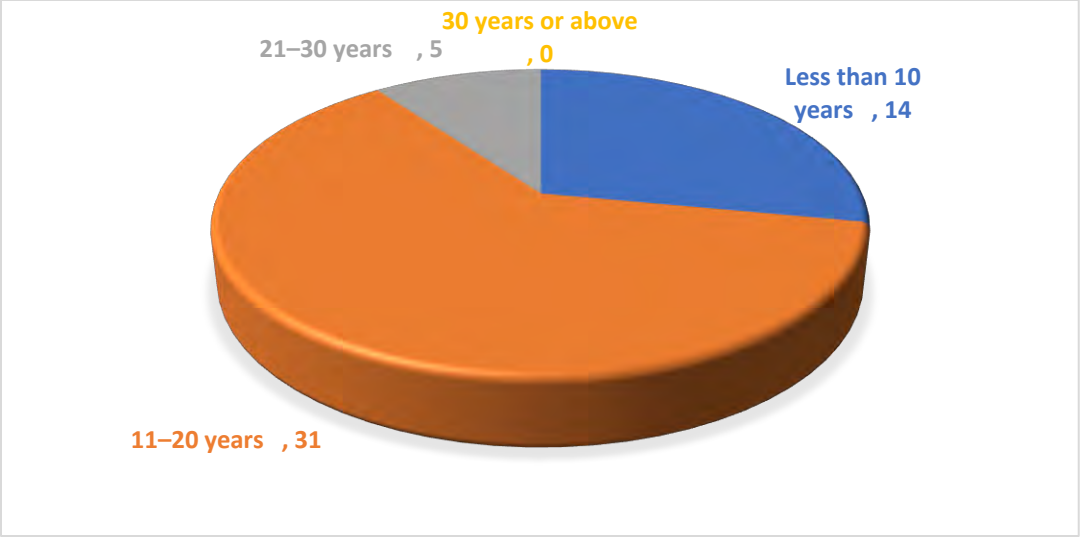


Figure 4.4: ***Work experience***

Source: Researcher's field work, 2021

4.3 Descriptive Results

The descriptive results covered the types of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited and the factors considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers.

4.3.1 The types of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited

Table 4.1 showed that gloves is a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited and had the highest mean of 4.30. Khaki overall is a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited with the next highest mean of 4.24. Footwear is a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited with the next highest

mean of 4.23. Goggles is a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited with the last mean of 3.16. The average distance a score was from the mean ranged from 0.853 to 1.296, representing the measure of dispersion (standard deviation) which widely spread the distribution. This means that all the items measuring the types of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited were high.

Table 4.1 Descriptive Statistics for types of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited

	S/N	Mean	Std. Deviation
Gloves	50	4.30	.876
Footwear	50	4.24	.867
Khaki overall	50	4.23	.853
Goggles	50	3.16	1.296

Source: Researcher's field work, 2021

4.3.2 The factors considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers

Table 4.2 showed that Training in the use of personal protective on-farm site is a factor considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers and had the highest mean of 4.36. Quality of personal protective equipment determines the use of personal protective garments on-farm site with the next highest mean of 4.34. User-friendliness of the protective garments on farm site is a factor considered by

the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers with the next highest mean of 3.60. Availability of personal protective equipment determines the use of personal protective garments on-farm site with the next highest mean of 3.21. The ease in care of the protective clothings determine the use of personal protective garments on-farm site with the next highest mean of 2.22. The average distance a score was from the mean ranged from 0.853 to 1.296, representing the measure of dispersion (standard deviation) which widely spread the distribution. This means that all the items measuring the factors considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothing for their workers were high. Therefore, these factors should be considered when selecting protective clothing for farmers.

Table 4.2 Descriptive Statistics for factors considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers

	S/N	Mean	Std. Deviation
Training in the use of personal protective on-farm site	50	4.36	.689
Quality of personal protective equipment determines the use of personal protective garments on-farm site	50	4.34	.868
User-friendliness of the protective garments on farm site	50	3.60	1.265
Availability of personal protective equipment determines the use of personal protective garments on-farm site	50	3.21	1.788
The ease in care of the protective clothings determine the use of personal protective garments on-farm site	50	2.22	1.279

Source: Researcher's field work, 2021

4.4 Analysis of interview response

The interview guide covered suggestions to help produce best clothings for your company's workers, the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited, and the sustainable approaches to be adopted for the production of protective clothing suitable for farmers.

4.4.1 Suggestions to help produce best clothing for your company's workers

Participants 1, 8, 45, 48, suggested that "quality of materials and adheres to safety standard and sizes help produce best clothing for your company's workers".

Participants 11, 4, 31, 23, 16, 19 and 39 suggested that "using reflectors in clothing and quality of materials help produce best clothing for your company's workers".

Participants 20, 13, 7, and 29 suggested that "clothing being up and down with correct sizes help produce best clothing for your company's workers".

Participants 40, 33, 26, 42, 35, 38 and 49 suggested that "using reflectors in clothing and adheres to safety standard and sizes help produce best clothing for your company's workers".

Participants 43 and 36 suggested that "clothing being up and down with correct sizes and quality of materials help produce best clothing for your company's workers".

Participants 2 and 46 suggested that "to help produce best clothing for your company's workers, quality of the material should always be looked at".

Participants 10, 5, 41, 34, and 27 suggested that "to help produce best clothing for your company's workers, they should be able to last for at least two years".

Participants 21, 14, 8, 50, 44, and 37 suggested that "to help produce best clothing for your company's workers, the clothing must be easy to wear with accurate sizes".

Participants 30, 24, and 17 suggested that "to help produce best clothing for your company's workers, reflectors should be added to the material and quality of the material should always be looked at".

Participants 3 and 47 suggested that "correct sizes of clothing help produce best clothing for your company's workers".

Participants 12, 6, and 9 suggested that "up and down clothing help produce best clothing for your company's workers".

Participants 22, 15, 32, 25, 28 and 18 suggested that "durable material help produce best clothing for your company's workers".

4.4.2 The types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited

As said by participants 2, 23, 30, and 12, "clothing protection, sun protective sunglasses, and latex/rubber footwear are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participants 23, "clothing protection is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participants 13, 32, and 43, "safety glasses, goggles, Nitrile protective gloves, bump caps steel toe footwear are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participants 33 and 22, "absorptive lenses, air purifying disposable particulate masks with exhalation valve, self-contained breathing apparatus (SCBA), padded cloth gloves, and full face shields (FFS) are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participants 34 and 42, "welding shields, protective measures, protective measures, and cap mount earmuffs are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participants 3 and 11, "cap mount earmuffs and air purifying disposable particulate masks with exhalation valve are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participants 21, 41, and 44, "self-contained breathing apparatus (SCBA) and padded cloth gloves are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 14, "safety glasses is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 24, "goggles is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 45, "nitrile protective gloves, bump caps, absorptive lenses, full face shields (FFS), and welding shields are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participants 4 and 31, "absorptive lenses is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 35, "steel toe footwear, safety glasses, goggles, and latex/rubber footwear are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participants 25, "reflective safety clothing, sun protective sunglasses, and sun protective clothing are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participants 1 and 15, "full face shields (FFS) is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by Participant 5, "flame-resistant clothing, clothing protection, and chemical-resistant coveralls and aprons are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 46, "protective measures is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participants 6, "cap mount earmuffs is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited"

As said by participant 36, "air purifying disposable particulate masks with exhalation valve is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 26, "padded cloth gloves is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 16, "nitrile protective gloves is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 17, "bump caps is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 37, "steel toe footwear is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 47, "clothing protection and sun protective sunglasses are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 27, "self-contained breathing apparatus (SCBA) is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 7, "welding shields is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 28, "safety glasses and goggles are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 18, "flame-resistant clothing is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 38, "absorptive lenses and full face shields (FFS) are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 48, "welding shields and protective measures are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 8, "cap mount earmuffs and air purifying disposable particulate masks with exhalation valve are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 9, "chemical-resistant coveralls and aprons is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 19, "self-contained breathing apparatus (SCBA) and padded cloth gloves are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 39, "nitrile protective gloves and bump caps are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 29, "steel toe footwear and latex/rubber footwear are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 49, "sun protective clothing is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 10, "reflective safety clothing and sun protective clothing are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 20, "flame-resistant clothing and chemical-resistant coveralls and aprons are the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 50, "latex/rubber footwear is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

As said by participant 40, "reflective safety clothing is the type of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited".

4.4.3 The sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 50 and 2 durabilities of the material is the sustainable approach to be adopted for the production of protective clothing suitable for farmers

According to participants 9, 19, 30, 33, 44 and 43 durability of the material and Quality of the material e.g.: 100% cotton are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 40, 23, and 12 standard operations procedures in sewing and maintaining standards and sizes are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 20 and 13 cost management and good customer service relationship are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 10 and 3 durabilities of the material and standard operations procedure in sewing are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 29 and 24 maintaining standards and sizes and good customer service relationships are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 39 and 14 standard operations procedure in sewing is the sustainable approach to be adopted for the production of protective clothing suitable for farmers

According to participants 49 and 4 durability of the material, quality of the material e.g.: 100% cotton, and standard operations procedure in sewing are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 8 and 45 maintaining standards and sizes, cost management, and good customer service relationship are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 18 and 35 durability of the material, cost management, and good customer service relationship are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 28, 25, and 41 maintaining standards and sizes is the sustainable approach to be adopted for the production of protective clothing suitable for farmers

According to participant 38, 15, and 31 quality of the material e.g.: 100% cotton, standard operations procedure in sewing, and maintaining standards and sizes are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participant 48, 5, and 21 durability of the material, quality of the material e.g.: 100% cotton, and good customer service relationship are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participant 7, 46, and 11 cost management is the sustainable approach to be adopted for the production of protective clothing suitable for farmers

According to participant 17, 36, and 1 standard operations procedure in sewing, maintaining standards and sizes, and cost management are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 27, 26, and 42 durability of the material, quality of the material e.g.: 100% cotton, and maintaining standards and sizes are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 37, 16, and 32 cost management, standard operations procedure in sewing, and good customer service relationship are the sustainable approaches to be adopted for the production of protective clothing suitable for farmers

According to participants 47, 6, and 22 good customer service relationship is the sustainable approach to be adopted for the production of protective clothing suitable for farmers

CHAPTER FIVE

DESIGN AND PRODUCTION OF THE MODIFIED PROTECTIVE CLOTHING

5.1 Introduction

Chapter five presents the design and production of the improved protective clothing. The items discussed in this chapter include the development of two prototypes of improved clothing for agricultural productivity in Ghana. A set of two different constructed garments were used for this research. They are the commonly used garments by agricultural farmers between the ages of 25 - 60 years. These are garments with some special features for comfort whiles working on the farm.

5.2 The Pattern Making Process

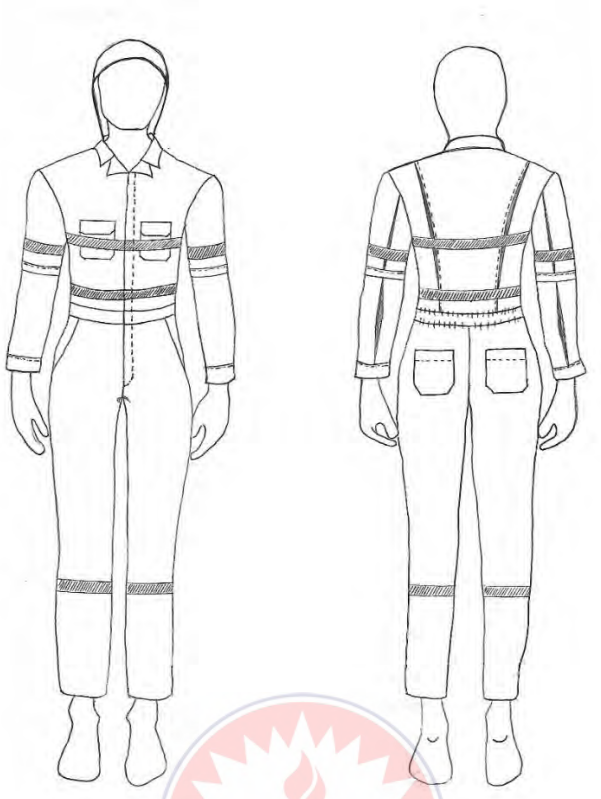
Pattern making is a metrical construction of a design for a particular figure (Liu et al., 2018). In constructing the patterns one needs a basic block patterns before adaptations of styles are made. It is important to have an appropriately fitting garment (Datta & Seal, 2018). All pattern area has a definite relationship with the figure that enables the garment to be worn and fit correctly. This means that centre front and back of garment should always be vertical to the floor hang straight up and down (Han et al., 2014). The grain lines of the garment should be parallel to these lines otherwise the garment will twist or pull. The cross grain of the pattern should always be parallel to the floor otherwise the garment will drag and pull down. Garment hang from the shoulder and bust, these pattern areas must be identical to the body shape for correct fit. If the pattern shoulder slope is off just five degrees from the body shoulder slope the garment will drape incorrectly (Suryani et al., 2018).

5.3 Design Development of Working Garments

The results of the design state inquiry and preference survey were used in the construction design of the working garments. Ergonomic aspects, colour elements, clothing construction elements, and clothing environment elements were all verified throughout the field fitting procedure, just like the design elements of the protective gear. In addition, ventilation access, detachable sleeves and trousers, shape, adjustment, pocket positions, overalls, trousers, and shirt lengths, and waist and sleeve tightness were determined, all of which were depicted as schematics on the work order sheet. The researcher designed two types of protective clothing. Moisture absorption, material quality, penetration, moistness, and pressure were all factors to consider when designing garments for the environment.

5.3.1 Design for Protective Clothing Style One

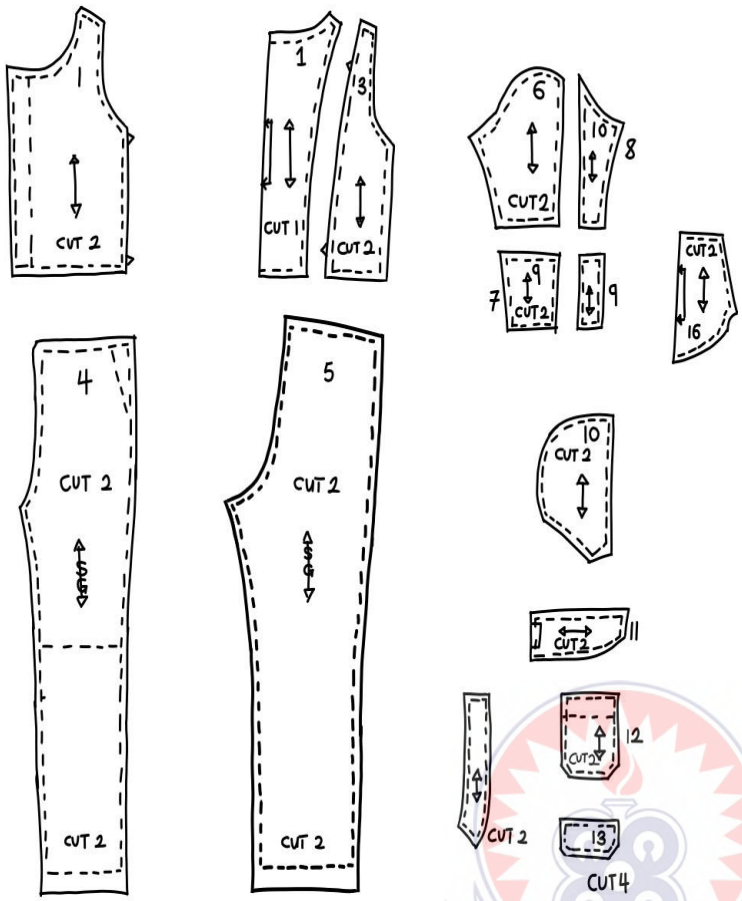
Overalls are the one-piece, loose-fitting suit that protects a vast region of the body from outside contamination. Overalls are a type of full-body protective suit that is worn over personal clothing and can protect employees from a variety of risks, including chemical, mechanical, thermal, and biological hazards. Overalls are available in a variety of fabrics, each with varying levels of resistance to a variety of industrial risks. Overalls protect the body from the ankles to the wrists, some disposable overalls have hoods for added protection. Overalls are required in a variety of industries, including agriculture, petrochemical, food, mechanical, emergency response, and other labor-intensive jobs (see Figure 5.1).



Front view Back view

Figure 5.1: Design for Protective Clothing Style One

Source: Researcher's field data, 2021



Key (For Patterns One)

1- Shirt center front

2- Shirt center back

3- Shirt center back side

4- Trousers front side

5- Trousers back side

6- Sleeve upper part

7- Sleeve down part

10- Hood

11- Shirt collar

12- Front patch pocket

13- Pocket cover

14- Fly piece

Figure 5.2: Patterns for Style One

Source: Researcher's field data, 2021

5.3.2 Overall Materials

Coveralls are available in a variety of materials, each of which contributes to their effectiveness as a protective barrier against dangerous contaminants. For example, woven fabric is not a good material for making a coverall because flaws in the material structure allow dangerous substances to permeate the suit. When creating protective coveralls, nonwoven textiles with a significantly denser structure are preferable.

5.3.3 How to Wear Coveralls

Coveralls must be worn appropriately since they are not an efficient form of protection against industrial hazards if worn incorrectly. The methods outlined here show how to put on coverall suits correctly for maximum performance.

1. Inspect the suit carefully for any faults or visible damage, such as tears or punctures. Protective coveralls that have been damaged should not be worn and should be replaced.
2. Take off any jewelry that could get caught in the coverall cloth and cause injury. Watches, for example.
3. Put on the suit, making sure it covers your wrists and ankles comfortably. If you are wearing a hooded coverall, make sure the hood fits snugly over your head.
4. Practice the movements you will be doing in the suit to confirm that your range of motion is unrestricted and that the coverall is the right size. To reduce the potential of inadvertent tears caused by restricting clothing, it is a good idea to order one size larger than usual.
5. Secure loose arm and leg cuffs over the top of gloves and boots with glove connectors or tape.
6. Take care in the workplace and be aware of your immediate surroundings to avoid damaging the garment and reducing its effectiveness, such as around sharp edges or hot surfaces (see Table 5.1).

Table 5.1: Production results and design details of working clothes

Concept	• **Working action convenience** • **Visual attention** • **Ventilation access**
Fabric and Colour	• 100% cotton (khaki) • Top: orange colour • Bottoms: orange colour
Top	• Using a reflector band for visual attention • Back pleats and shoulder pleats for action convenience • To use mesh at the back and sleeves region for ventilation • convertible sleeve
Bottoms	• Knee dart on pants for convenience in movement, rubber band in the waist • mesh on pants' crotch for ventilation
Fastenings	• pocket, sleeve, placket: (snap) metal • Trousers: zip

Source: Researcher's field data, 2021

5.3.4 Design for Protective Clothing Style One

The design for style two was mainly on trousers, shirt, yoke and side seams, front placket and pockets, collar and buttons, hem, sleeve plackets, cuffs

5.3.5 Trousers

1. Make sure your design fits you by trying it on until you are completely satisfied.
2. On the cloth, trace the trouser pattern. If your pattern doesn't have any SAs, use chalk to make a 5/8th-inch border all the way around. Carefully cut out the waistband, keeping it in place for now.
3. Stitching lines at the hem, knee, and pocket stitching line should all be tacked. On the side trouser pieces, you will likewise have to mark the placement pocket line, the waist seam, and the CF seam (showing zip end). Overlocked edges and tailor's tacks

4. Overlock every edge save the waist top edge, taking care not to cut any width, just the stray fibers, and mild unevenness. Remove the overlocking threads with a pair of scissors. trimmings from the overlocker
5. Iron-on interfacing to the fabric covers the front region from about 2″ in from the CF seam line to the fabric edge to stabilize the entire area. The weight must be light but firm. This is necessary for proper zip insertion.
6. Stitch the pocket lining to the trousers' front with care. Seams should be pressed upwards. On the interior of the pocket, stitch close to the original stitching line. This is done to keep the lining in place on the pocket inside and prevent it from gaping. Use lining fabric for less bulk, nonetheless, the pocket will be crisper if you use fashion fabric. pocket liner is sewn to the front of the trouser
7. Fold the pocket back into its original position. Judiciously apply pressure. Don't even think about moving the iron. Simply make the pockets flat and nice. Permit time for them to cool. Remeasure them to make sure both pockets are equal length and that the tailor's tacks on both pocket opening ends are even and visible.
8. Place the trouser fronts on the side pieces, lining up the sewn pocket edge exactly. Check both sides to make sure the pocket placement is symmetrical by positioning both fronts next to each other and measuring judiciously. Place the front trouser piece on top of the side piece with the pocket liner connected.
9. Stitch the trouser pockets shut along the line where you did put your hand.
10. Sew the pocket lining to the side piece of the pants to complete the pocket bag. Because the pocket lining is smaller than the side piece of the pocket, you will not be stitching edge

to edge. The extension helps keep the pocket in place across the abdomen. Trim and press the edges.

11. Place the trouser fronts on the side pieces, lining up the sewn pocket edge exactly. Check both sides to make sure the pocket placement is symmetrical by positioning both fronts next to each other and measuring carefully. Place the front trouser piece on top of the side piece with the pocket liner connected.
12. Stitch the trouser pockets shut along the line where you'd put your hand.
13. Sew the pocket lining to the side piece of the pants to complete the pocket bag.
14. Because the pocket lining is smaller than the side piece of the pocket, you will not be stitching edge to edge. The extension helps keep the pocket in place across the abdomen. Press and trim the edges.
15. Stitch the CF seam with a long basting stitch to where the zip will terminate, and then down to the end permanently. Clip the zip fly extensions at the base of the curve and push them flat. This is the most important aspect of a good zip finish.
16. Next, we'll add a lapped front zip. Using an 8″ zip that is at least 2″ longer than the zip you require, yet provides for easier insertion because the zip pull is out of the way while sewing.
17. You will attach the zip to the extension, so decide which side you want the ornamental top stitching to be on. Turn everything but the extension to the side so you are only working with one thickness of the fabric. Place the zip facing down on one side of the basted CF seam. Pin the zip in place, making sure it is perfectly aligned with the CF line. affix the zip to one side of the CF
18. Using a conventional zipper foot, stitch upwards from the bottom of the zip to the waist line of the trousers. In the photo above, the stitching line is on the left side of the zip, with

the right edge of the zip running along the basted CF seam (tailor tacked). Keep in mind that you are just stitching one layer of fabric.

19. Now fold the interfaced extension back so you are looking at the zip from the right side, and sew it down from the front, reaching near to the teeth and producing a good flat finish, securing the zip. You are still stitching on the flap's one side, but this time you are sewing through two layers of fabric. For a lapped front fly, attach the zip to the extension.
20. The zip is then attached to the opposite side of the pants. Return it to the other extension and allow it to fall where it will. Pin and attach the zip to the extension from the other side of the trouser fronts with only one layer of cloth involved. There is no requirement for the zip to line up with anything. It simply has to fall where it may. Stitch along the teeth on the reverse side of the zip.
21. Turn the trousers around so that you can see them from the front. Although the zip is attached, it is not visible when looking at the trousers. The CF is nice and straight, and It is also really steady. The ornamental top stitching, which also secures the zip in place, is added at this point.
22. Make a note of where the metal end of the zip is so you don't accidentally stitch over it with the sewing machine needle. Now, one and a quarter inches out from the CF line, draw a chalk line that curves beautifully into the CF seam. Making a line for the fly sewing
23. Stitch gently and slowly on the line you have drawn, starting at the bottom and continuing to use the zipper foot. It is unlikely that you will catch the zip, but that's irrelevant because It is already attached. When you remove the CF basting thread (which you should not do yet), the zip will work correctly. The zip puller is currently located at the top of the trousers.

24. Stitching the fly Stitch the back darts from the top to the tip of the back trouser pieces. Allow drying while pressing towards the CB seam.
25. Clip the CB seam at the curve and stitch it. Set the stitches and then cool the seam by pressing it open. Sew along the seam of the CB.
26. Begin pinning the first side seam together at the knee level tailors tack, working your way down to the hem and up to the waist, paying special attention to where the pocket seam will be constructed. Before sewing, measure the length of both pockets from the top of the pants to ensure they are the same length. Because you don't want to attach the bag to the side seam, clip the pocket so that it may be kept back with a large pin. Allow for a straight side seam by clipping the pocket. Then, from waist to hem, make a long straight seam.
27. Press the seam open down the whole length of your ironing board, being careful to keep it as flat as possible around the pocket region if required trimming a little of the SA allowance away to decrease bulk. Allow for cooling before continuing with the other leg.
28. Sewing the inside leg seam is now doable. Match the front and back at the crotch with a pin along the seam to check the join is exact before continuing. You may machine baste this for approximately an inch if you want to make sure It is precise. Beginning at one of the ankle seams, sew the entire seam in one straight line. The pressing has become increasingly difficult. I use a point presser, which I place into the trousers from the waist, pushing it down the leg to the hem of one leg, pressing, clapping, and allowing it to cool before moving it along the length of the seam. This ensures that all seams will be pressed without distorting or creasing the trouser legs. The inside leg seam is being pressed (see Plate 5.1, 5.2, 5.3, and 5.4).

Plate 5.1: Front of the Overall Style One

Source: Researcher's field data, 2021

Plate 5.2: Back of the Overall Style One

Source: Researcher's field data, 2021

Plate 5.3: Front of the Convertible Protective Overall Style Two

Source: Researcher's field data, 2021

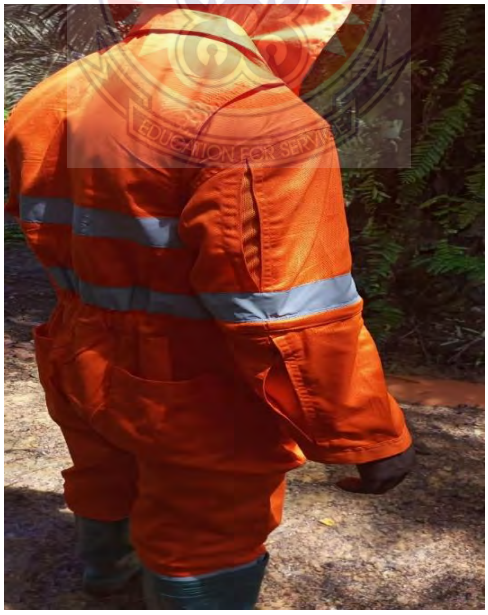


Plate 5.4: Three-Quarter View of the Convertible Protective Overall Style Two

Source: Researcher's field data, 2021

5.4 Design for Protective Clothing Style Two

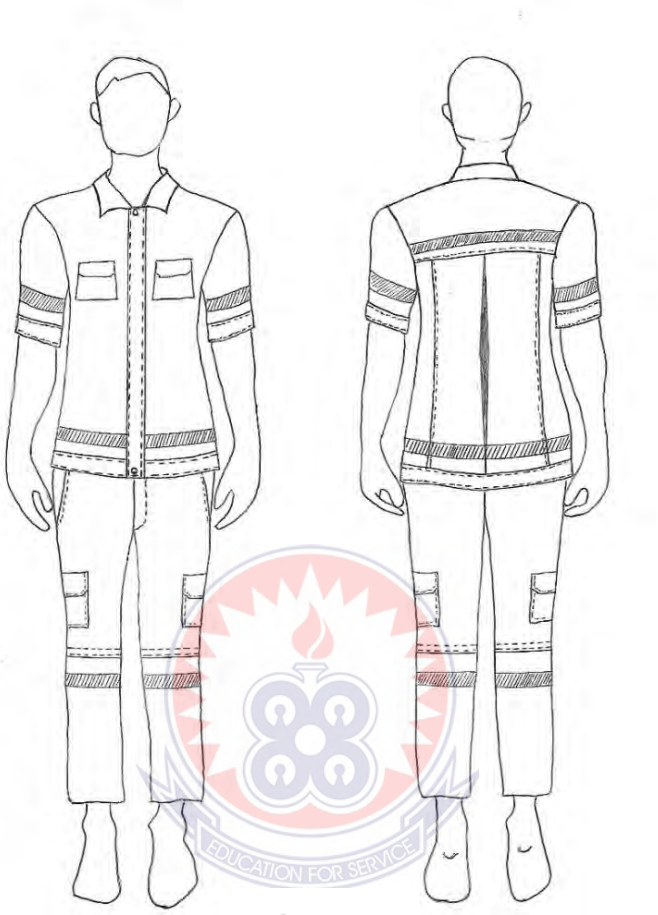


Figure 5.3: Design for Protective Clothing Style Two

Source: Researcher's field data, 2021

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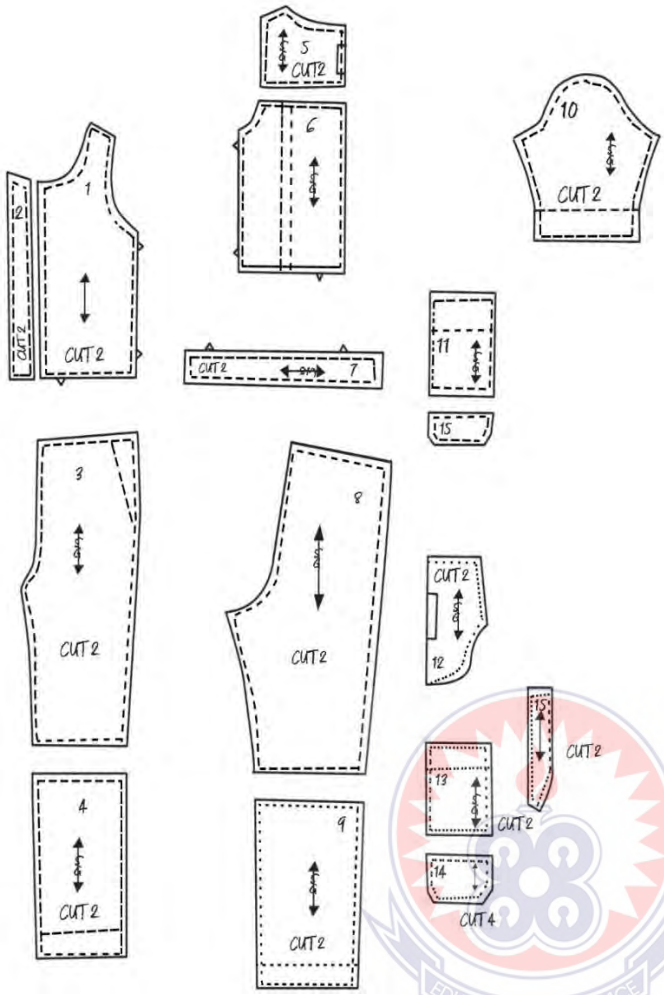

Key (For Patterns One)

1- Shirt center front

2- shirt flap

3- Trousers front side (top)

4- Trousers front side (down)

5- Shirt yoke

6- Shirt center back

7- shirt band

8- Trousers back side (top)

9- Trousers back side (top)

10- Short sleeve

11- Shirt patch pocket

12- Trousers pocket piece

13- trousers patch pocket

14- trousers pocket cover

15- Fly piece

Figure 5.4: Patterns for Style Two

Source: Researcher's field data, 2021

5.5 Shirt:

5.5.1 Yoke and side seams

1. Fold the pleat back in half and baste it 1 inch from the fold.
2. Open it up and hit the button.
3. Sew the back together with the two yokes, then press the yokes away from the back and under the seam allowance on the outer yoke shoulder seams.
4. With the wrong sides together, sew the fronts to only the yoke lining, pressing toward the yoke. Stitch as close to the folded seam allowance as possible when topstitching the outer yoke over the seam allowance. Stitch around the neckline.

5.5.2 Front placket and pockets

1. Cut out two fronts, two sleeves (both on the fold), two collar blades, and two collar bands on the fold, two yokes on the fold, and one back on the fold. Cut a notch on each sleeve to mark placket placement.
2. For fabrics with no right or wrong side, such as solids or woven-in designs, the following procedure works well. You will need to cut the placket separately if your fabric has a printed pattern or a non-reversible weave like twill, satin, or brocade.
3. Cut two strips measuring the finishing placket width (1 1/4″ is usual) by the length of the front edge, minus five inches, if you are using interfacing for the front placket. Lay out the fronts and apply the interfacing if your shirt will button left over right (as in men's clothing).
4. If your shirt will button left to right (as in women's clothing), arrange it down as follows: Press under 1/2″ down the front edge on both sides, then 1 1/4″.
5. Determine the shape and size of the pocket(s) you want.

6. For a more casual look, I trimmed mine 5″x6″ for a finished dimension of 4 3/8″x5″ and cut the corners at an angle. Sew crosswise close to the fold, pressing 3/8″ under on the top edge of each one, then 5/8″ under to produce the top hem.
7. Press the remaining sides under 1/4″- 3/8″.
8. Secure the pockets with pins. Remember to account for seam allowance and yoke when measuring down from your shoulder to get an idea of where you want the top of your pocket to sit.
9. When topstitching the pockets down, begin at the stitching line and angle in 1/8″ toward the top edge. Stitch for 1-3 stitches down the top, then down the side of the pocket and along the bottom. This will strengthen the top corners of the pocket, which are a stress areas.

5.5.3 Collar and buttons

1. Press interfacing onto one collar band and one collar blade if you are using it. On the bottom border of the interfaced band, press up the seam allowance.
2. Right sides together, sew collar blades along outer edges.
3. Topstitch 1/8″ from the edge, pressing seam allowance, clip corners, and turn.
4. Sandwich the collar blade between the collar bands, with the interfaced blade facing the non-interfaced band and vice versa. Interfacing should be on the visible side of the blade, and the interior of the collar should be softer.
5. Trim the interfacing to 3/8″, turn, and press it. Sew the non-interfaced band, wrong sides together, to the shirt's neckline, then press. Topstitch the folded seam allowance in place

as near to the edge as possible, starting at the button side corner and stitching around the collar band.

6. Before sewing your buttonholes, test the buttonhole setting on scraps to make sure everything is working properly. Mark the collar buttonhole first, parallel to the band's edges, and lined with the placket's center line. Mark the rest of the buttonholes along the front placket's center line, with the top buttonhole evenly separated from the collar buttonhole and the bottom buttonhole close to or at the hip line make them three to four inches apart.
7. Once the buttonholes are finished, mark where you want the button to go.
8. Finally, sew your buttons on. It is best to start with a "anchoring stitch" and then take three stitches through each set of holes.
9. Sew wrong sides together side seams with a 1/2″ seam allowance. To make a flat-felled seam, trim the rear seam allowance to 1/4″ and press the longer front seam allowance over it.
10. Press the seam open, then topstitch it in place.

5.5.4 Hem

1. Bast near to the edge with the greatest stitch length, folding in 1/4″. Fold in 1/4″ again and sew with regular stitches, gathering basting thread as necessary.

5.5.5 Sleeve plackets

2. Make a pattern for your placket.

3. Cut a notch between the stitching lines that will match up with the notch on the sleeves for placket placement.
4. Cut two pieces of interfacing the same length as the long portion of the placket and 3/4″ to 1″ wide, as shown. Fold one corner, then the other, across.
5. Finally, cut along the fold lines. Make a second strip the same width as the under placket (which should be the same width as the seam allowance, or it will bunch). To secure the interface, press it into position.
6. Fold the top placket's corners in. Firmly press them.
7. Unfold the corners and refold them in the following manner:
8. Firmly press them into place and secure them with pins. Match the notches on the plackets and pin them on the sleeves.
9. If you haven't already done so, mark the stitching line. Sew around the edges, pivoting at the corners.
10. Cut apart and cut the corners into a Y-shape. Without ripping anything, you should be able to pull the stitching line straight.
11. On the underside of the placket, press in the seam allowance.
12. Fold the placket under the seam allowance and topstitch it in place.
13. Fold the seam allowance toward the placket.
14. Press the placket over the seam allowance.
15. Topstitch in place, starting 1 1/4″ from the point of the placket to catch the underplacket with a line across the placket. Stitch at a distance of less than 1/8″ from the edge.
16. Make sure you don't snag the underplacket underneath after you have gone around the bottom.

17. Use a flat-felled seam to sew the underarm seams. As a result, the sleeve on the machine will appear like this:
18. Be patient and take things slowly. I promise it'll work. When you are finished, sew around the top of the sleeve.

5.5.6 Cuffs

1. Iron interfacing onto two of your four cuff pieces and press up the bottom 1/2″ seam allowance.
2. Sew each interfaced piece to a non-interfaced piece, pressing the seam allowance inward.
3. I picked an angled corner for the cuffs because I enjoy how the corner serves as a guideline for cutting the seam allowance.
4. Take a look at how well that folds in and trims down.
5. Finally, give it a good squeezing.
6. Your sleeve's wrist edge will be a few inches longer than your cuff. To avoid dealing with extra pins, divide the surplus into 2-3 pleats that you can secure with basting threads.
7. Right sides out, pin cuffs to sleeves. Sew toward the cuff and press.
8. Starting at the underplacket and proceeding around the edge of the cuff, topstitch the folded seam allowance over the seam.
9. Place your buttonholes 1/2 inch from the cuff's edge, centered.
10. Pin the sleeve into the armscye with the wrong sides together, matching the top and bottom.
11. Add more pins as needed to gather the sleeve seam allowance. Trim the sleeve seam allowance to 1/4″ and press the body seam allowance over it after sewing around the armhole.

12. Flat-felling the armscye is a challenge, but It is well worth it. Make sure your sewing machine has a section that pops out so you can slip something like this in there (see Plate 5.5, 5.6, 5.7, and 5.8).

Plate 5.5: Front of the Convertible Protective Overall in the Pair of Short Sleeve Top and Trouser Form

Plate 5.6: Back of the Convertible Protective Overall in Short Sleeve Top and Trouser Form

Source: Researcher's field data, 2021

Plate 5.7: Front of the Convertible Overall in Short Sleeve and Shorts Form

Plate 5.8: Back of Convertible Overall in Short Sleeve and Shorts Form

Source: Researcher's field data, 2021

Table 5.2: Production results and design details of working clothes

Concept	• **Convenience of working action** • **Visual attention** • **Ventilation**
Fabric and Colour	• 100% cotton (khaki) • Top: blue/blue • Bottoms: blue/blue
shirt	• Using a reflection band for visual attention, yellow-green coloration • Shoulder pleats and back pleats for convenience of action • To use mesh in the shoulder and armpit region for ventilation
Trousers	• Knee dart on pants for convenience in movement, rubber band in the waist • lose for easy movement, ventilation, and convertible leg
Fastenings	• Sleeve, pocket, placket: (snap) metal • Trousers: hook & eye and zip

Source: Researcher's field data, 2021

5.6 Design Evaluation

The produced working garments for the test were applied to the field and evaluated at Benso Oil Palm Plantation and Ghana Rubber Estates Limited. The researcher visited the field twice to evaluate the garment. The design evaluation was performed separately with two workers and with their supervisors. Two workers wore the garment and their front, side, back, and movements were evaluated. The workers performed fitting work in the field for two days and they were asked for their opinions on satisfaction with the overall appearance, satisfaction with colours, satisfaction with safety, psychological satisfaction, and choice of fabric used for the construction.

5.7 Acceptability of the Garments

A checklist was created using visual analysis from the researcher's field study and an interview with a worker. By interviewing workers, the researcher was able to check the values in two categories (ergonomics and fabric selection) and add two more areas (clothing environment and construction) to the study. The garments were acceptable by the respondents involved in the application. Protective clothing should undoubtedly be used to avoid health hazards, according to the respondents, and protective clothing did not have an adverse influence on work efficiency. Protective clothes may be washed and maintained easily because of the functional features/fasteners employed in their design. The farm workers strongly agreed that other people should wear protective clothing and that it was worthwhile to spend more money on it. As a result, it was concluded that the majority of respondents had a favorable opinion of protective apparel. The findings of the study agree with Makkar (2005), who stated that the produced protective apparel was well received by the respondents and was proven to be effective in limiting pesticide absorption via the skin. Protective apparel has no negative impact on productivity and does not

cause pinching. Conclusion According to the findings of this study, the majority of respondents believed that protective clothing is simple to put on and take off and that we should use it to avoid health concerns. The majority of respondents agreed that wearing protective clothing while farming is a good idea. It is advised that attention be given to designing and executing pesticide safety educational programs for farmers to raise farmers' understanding of pesticides and reduce pesticide-related dangers.

5.8 Assessment of New Garment

- Clothing absorbs heat
- Clothing is easy to put on and take off
- Clothing does not appear unattractive
- Functional features/fasteners in garments do not cause pinching
- Clothing has no negative impact on job productivity
- It is worth spending extra money on protective clothes
- I will recommend that other people use protective clothing
- The garments are comfortable due to their functional features

5.9 Assessment of Old Garment

- Less absorbent of perspiration
- Retains heats
- Burns and leaves hard circular knobs
- The functional elements in protective gear obstruct work
- Clothing washing and maintenance are difficult
- This garment should not be advised because it is ineffective (see Plate 5.9 to 5.14).

Plate 5.9: Existing Protective Overall

Plate 5.10: Front of Existing Protective Overall

Source: Researcher's field data, 2021

Plate 5.11: Existing Protective Overall

Plate 5.12: Front of Existing Protective Overall

Source: Researcher's field data, 2021

Plate 5.13: Existing Protective Overall

Plate 5.14: Front of Existing Protective Overall

Source: Researcher's field data, 2021

5.10 Discussion of findings

5.10.1 The types of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited

Findings revealed that gloves was a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited and had the highest mean of 4.30. Related can be found in an article by Kim (2014). Khaki overall was a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited with the next highest mean of 4.24. Footwear was a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited with the next highest mean of 4.23. Similar observation was made by International Labour Office (2008). Goggles was a type of protective clothing used by

farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited with the last mean of 3.16. European Agency for Safety and Health at Work (2011) intimated a similar observation.

5.10.2 The factors considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothing for their workers

Findings revealed that training in the use of personal protective on-farm site was a factor considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers and had the highest mean of 4.36. This was in similitude to the report of Health and Safety Executive (2012). Quality of personal protective equipment determined the use of personal protective garments on-farm site with the next highest mean of 4.34. User-friendliness of the protective garments on farm site was a factor considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers with the next highest mean of 3.60. Related can be found in an article by Lombardi et al. (2009). Availability of personal protective equipment determined the use of personal protective garments on-farm site with the next highest mean of 3.21. The ease in care of the protective clothings determined the use of personal protective garments on-farm site with the next highest mean of 2.22. Krol (2009) intimated a similar observation.

5.10.3 The types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited

Findings revealed that the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited were clothing protection, sun protective sunglasses, safety glasses, goggles, absorptive lenses, full face shields (FFS), welding shields, protective measures, cap

mount earmuffs, air purifying disposable particulate masks with exhalation valve, self-contained breathing apparatus (SCBA), padded cloth gloves, nitrile protective gloves, bump caps, steel toe footwear, latex/rubber footwear, reflective safety clothing, sun protective clothing, chemical-resistant coveralls and aprons, and flame-resistant clothing. A similar observation was made by Occupational Health and Environmental Safety Council (2009).

5.10.4 The sustainable approaches to be adopted for the production of protective clothing suitable for farmers

Findings revealed that durability of the material, quality of the material e.g.: 100% cotton, standard operations procedure in sewing, maintaining standards and sizes, cost management, and good customer service relationship were the sustainable approaches to be adopted for the production of protective clothing suitable for farmers. Related can be found in an article by Smith & Keeler (2007).

5.10.5 Suggestions to help produce the best clothing for the farmers

Findings revealed that quality of materials and adhering to safety standards and sizes help produce best clothing for your company's workers. Also, using reflectors in clothing and clothing being up and down with correct sizes help produce the best clothing for your company's workers. To help produce the best clothing for your company's workers, the quality of the material should always be looked at, they should be able to last for at least two years, the clothing must be easy to wear with accurate sizes, reflectors should be added to the material and the clothing must be durable and easy to wear. Lind & Nenonen (2008) intimated a similar observation. The designed protective clothing of an improved version of the old garment was absorbent of heat and does not look

awkward as compared to the old garment. The washing and maintenance of the old garment were difficult and the functional features in the protective clothes cause hindrance at the workplace while the new garment can be washed and maintained easily, does not have an adverse effect on work efficiency and it is worth spending extra money on protective clothing. Therefore, the improved garment should be recommended because they are comfortable due to their functional features as compared to the old garment.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The study aims to improved clothing for agricultural productivity in Ghana at Benso Oil Palm Plantation and Ghana Rubber Estates Limited. Chapter six discusses the findings of the studys. and presents the discussion the findings, summary of findings, conclusions and recommendations.

6.2 Summary of findings

6.2.1 The types of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited

It was revealed that gloves were a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited. Khaki overall was a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited. Footwear was a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited. Goggle was a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited.

6.2.2 The factors considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers

It was revealed that training in the use of personal protective on-farm sites was a factor considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers. Quality of personal protective equipment determined the use of personal

protective garments on-farm site. User-friendliness of the protective garments on farm site was a factor considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers. Availability of personal protective equipment determined the use of personal protective garments on-farm site. The ease in care of the protective clothings determined the use of personal protective garments on-farm site.

6.2.3 The types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited

It was revealed that the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited were clothing protection, sun protective sunglasses, safety glasses, goggles, absorptive lenses, full face shields (FFS), welding shields, protective measures, cap mount earmuffs, air purifying disposable particulate masks with exhalation valve, self-contained breathing apparatus (SCBA), padded cloth gloves, nitrile protective gloves, bump caps, steel toe footwear, latex/rubber footwear, reflective safety clothing, sun protective clothing, chemical-resistant coveralls and aprons, and flame-resistant clothing.

6.2.4 The sustainable approaches to be adopted for the production of protective clothing suitable for farmers

It was revealed that durability of the material, quality of the material e.g.: 100% cotton, standard operations procedure in sewing, maintaining standards and sizes, cost management, and good customer service relationship were the sustainable approaches to be adopted for the production of protective clothing suitable for farmers.

6.2.5 Suggestions to help produce best clothing for your company's workers

It was revealed that quality of materials and adherence to safety standards and sizes help produce the best clothing for your company's workers. Also, using reflectors in clothing and clothing being up and down with correct sizes help produce the best clothing for your company's workers. To help produce best clothing for your company's workers, the quality of the material should always be looked at, they should be able to last for at least two years, the clothing must be easy to wear with accurate sizes, reflectors should be added to the material and the clothing must be durable and easy to wear. The washing and maintenance of the old garment was difficult and the functional features in the protective clothes cause hindrance at the workplace while with the new garment can be washed and maintained easily, does not have an adverse effect on work efficiency and it is worth spending extra money on protective clothing.

6.3 Conclusions

The research adopted the mixed-method approach of research design. This pragmatic approach was a sequential exploratory design. The Population of the study consisted of all the garment agricultural farmers workers between the ages of 25 to 60, engaged in farming where each worker was considered as a unit of analysis. A purposive sampling method was used and stratified random sampling was adopted for analysis and data verification for this study. As a research tool, a questionnaire survey was conducted on 50 farmers from Benso Oil Palm Plantation and Ghana Rubber Estates Limited. The major tools for data collection were the questionnaire and interview schedule. Results showed that gloves, khaki overalls, footwear, and goggles were a type of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited.

Results also revealed that training in the use of personal protective on-farm site, quality of personal protective equipment, user-friendliness of the protective garments on farm site, availability of personal protective equipment, the ease in care of the protective clothings were a factor considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers. The types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited were clothing protection, sun protective sunglasses, safety glasses, goggles, absorptive lenses, full face shields (FFS), welding shields, protective measures, cap mount earmuffs, air purifying disposable particulate masks with exhalation valve, and many more.

Quality of materials and adheres to safety standard and sizes help produce best clothing for your company's workers. Also, using reflectors in clothing and clothing being up and down with correct sizes help produce best clothing for your company's workers. To help produce best clothing for your company's workers, quality of the material should always be looked at, they should be able to last for at least two years, the clothing must be easy to wear with accurate sizes, reflectors should be added to the material and the clothing must be durable and easy to wear. Durability of the material, quality of the material e.g.: 100% cotton, standard operations procedure in sewing, maintaining standards and sizes, cost management, and good customer service relationship were the sustainable approaches to be adopted for the production of protective clothing suitable for farmers. In conclusion, the proposed improved clothing for agricultural productivity in Ghana is the best.

6.4 Recommendations

The improved garments designed and produced in this project are recommended for use for their functional features as compared to the old garment. Ministry of Food and Agriculture, government agencies, academia, researchers, and other stakeholders should consider the findings of the current study when making decisions and preparing further studies on the types of protective clothing used by farmers in Benso Oil Palm Plantation and Ghana Rubber Estates Limited and the factors considered by the Benso Oil Palm Plantation and Ghana Rubber Estates Limited for the selection of protective clothes for their workers.

6.5 Suggestions for future studies

It is recommended that researchers should focus on different population and sample size with the same topic.

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APPENDICES

APPENDIX A

QUESTIONNAIRE

Dear respondent, this questionnaire is designed to gather data about the assessment of protective clothing on agricultural productivity in Ghana. This research project is conducted by Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development, Kumasi Masters student, and your kind cooperation in this research is very much appreciated. Your anonymity and confidentiality are assured.

SECTION A

YOUR PERSONAL DATA

Please indicate your response to statements by ticking [√] the appropriate box.

1. Name of company: Benso Oil Palm Plantation [ ] Ghana Rubber Estates [ ]
2. Age: 25-34 years [ ] 35-44 years [ ] 45-54 years [ ] 55-60 years [ ]
3. Gender: Male [ ] Female [ ]
4. Work experience in this organization: Less than 10 years [ ] 11–20 years [ ] 21–30 years [ ] 30 years or above [ ]

SECTION B:

Protective clothing you use in your company

Item	Yes	No
1. Khaki overall	[ ]	[ ]
2. Gloves	[ ]	[ ]
3. Goggles	[ ]	[ ]
4. Footwear	[ ]	[ ]

Others (please specify) …….

SECTION C

FACTORS CONSIDERED FOR THE SELECTION OF PERSONAL PROTECTIVE CLOTHINGS IN YOUR INDUSTRY

This category contains statements about the factors that determine the use of personal protective garments on the farm site of your company. Please indicate your level of agreement with the statements using the 5 points likert scale below by ticking [√] the appropriate box:

1= Strongly agree 2= Agree 3= Neutral 4= Disagree 5= Strongly disagree

S/N	Statement	1	2	3	4	5
1.	Availability of personal protective equipment determines the use of personal protective garments on-farm site					
2.	Quality of personal protective equipment determines the use of personal protective garments on-farm site					
3.	The ease in care of the protective clothing determines the use of personal protective garments on-farm site					
4.	User-friendliness of the protective garments on farm site					
5.	Training in the use of the personal protective on-farm site					

SECTION D:

1. What are your suggestions to help produce the best protective garments for your company's workers?

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Thank you

INTERVIEW GUIDE

Please provide your appropriate answer in the spaces provided.

1. Identify the types of PPEs used among farmers at Benso Oil Palm Plantation and Ghana Rubber Estates Limited

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2. What sustainable approaches can be adopted for the production of protective clothing suitable for farmers?

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