Analysis and prognostication of consumer preferences at designing working clothes for workers of agricultural clusters of Uzbekistan

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Abstract. The article covers the design of rational working clothes for workers of cooling rooms of agricultural clusters. Based on a survey of opinions of consumers, the most preferred types of working clothes, their completeness, color, and the most important indicators of material properties were identified. Because of a survey of opinions of consumers, the requirements for the designed working clothes were formulated.

1. Introduction
In purpose to develop working clothes for workers of agricultural clusters in Uzbekistan, along with the study of working conditions and the current state of the consumer market of working clothes, a questionnaire survey of consumer opinion was carried out. The use of this method to identify important information features is because all the features that characterize working clothes are of a qualitative nature, and the modeled indicator cannot be expressed in quantitative form [1].

2. Literature review
It is known that statistical data are characterized by many acting in different directions interrelated factors influencing them, which causes certain difficulties in their statistical processing. In some cases, there is a lack of initial information due to the impossibility of using features for one reason or another in quantitative form. The solution to this issue is possible by the experience and knowledge of industry experts in the application of the questionnaire survey. With the help of a wide survey of leading industry experts, it is possible to identify the most informative signs using different methods of organizing a questionnaire. This approach allows reducing the amount of proposed experimental work, to accept or reject some preliminary hypotheses, in addition, to determine the influence of various factors on the optimization parameters.

3. Research methods
To identify functional requirements and clarify the characteristics of working clothes, a questionnaire survey was conducted among employees of the Romitan agro-industrial complex “BCT Cluster” and employees directly involved in the production of working clothes [2]. The survey was conducted jointly with representatives of the agro-industrial complex “BCT Cluster” among employees. These are workers aged 19 to 22, working at the plant for a not long period – from 1 to 7 years; workers aged 23 to 46 years, working in the agro-industrial complex for a significantly long time – from 8 to 15 years. A survey
in the form of a questionnaire is known to be a reliable tool in sociological research. The survey of experts was carried out using a questionnaire and personal conversation. The questions in the questionnaire reflect the following factors affecting working clothes and taken into account in its development: aesthetic-constructive solution, which depends on the color, silhouette and type of working clothes set, choice of materials, hygienic properties, exposure to production and climatic factors, wear factors.

The method of a priori ranking was used to process the results of the questionnaire [3]. Usually, a priori ranking of factors is carried out in the following sequence: based on literature data, a list of factors influencing the parameter under study is compiled, and the domain of definition of each of the factors is established. Then it is offered to specialists working in this field to arrange the factors in a row according to their degree of influence. At the same time, each specialist can supplement the list if, in his opinion, it is not complete or express an opinion on changing the variation intervals. The contribution of each factor is assessed by the value of the rank-place, which the specialist assigns to this factor when ranking all factors, taking into account their expected influence. The factor that is assigned the leading role is given the first place, the rest are arranged in decreasing order of their influence on the parameter under study. If it is difficult to determine the prevailing influence of some factor over another, then they are assigned the same ranks, which are the arithmetic mean of their supposed sum of ranks. The results of the survey of experts are presented in form of matrix of ranks [3].

The results of survey are shown in figure 1.

![Figure 1](image1.png)

**Figure 1.** Distribution of opinions of the respondents on the importance of the properties of working clothes.

Analyzing the results of the questionnaire survey of employees, we can say that the most important indicator of working clothes in the summer is hygroscopicity and air permeability, and in winter - heat-shielding properties, which depend on the properties and structure of the package of materials, taking into account the functional responsibility of each of them. It was revealed that in the summer, workers prefer to wear a jacket and trousers, and overalls and a jacket in a winter (figure 2).

![Figure 2](image2.png)

**Figure 2.** Distribution of the opinions of respondents on the preference for completeness of working clothes in the summer.
Because of the survey, it turned out that the most important indicator of working clothes is its convenience and protective functions, then its appearance and color. The respondents rate the conformity of a product to fashion in one of the last places (figure 3).

![Figure 3. Distribution of opinions of respondents about the importance of indicators of special clothing.]

In working clothes, they prefer light colors, a zipper on a jacket and trousers, and emblems as decorative elements (figure 4).

![Figure 4. Distribution of opinions of respondents about the color of the working clothes.]

Analysis of the opinions of the respondents showed that the main factors in the wear of overalls are the loss of color and shape. Inspection of the sets of overalls available to workers showed that they are either morally outdated or not intended for this type of production (they consist of randomly selected types of products). It was found that during work, the chest, arms, legs, elbow and knee joints of the worker are the most vulnerable parts of the body to injury. During work, the design of the overalls should correspond to the movement of the worker as much as possible; the material for working clothes must be breathable, strong and durable.

Special comparative research [2] of the influence of the type and cut of working clothes on the dynamics of worker movements were carried out for several types of working clothes: jacket and trousers, overalls, semi-overalls with a jacket. In closed clothes (overalls, semi-overalls with a jacket), the body temperature rises sharply during work up to 38 °C, and in free-form clothing (jacket and trousers), the body temperature during work is from 36.8 to 38 °C. An increase in body temperature can provoke the release of sweat in large quantities and cause discomfort to the worker. This may be one of the reasons for the deterioration of the worker's well-being during work. Thus, in a set of special clothing, consisting of a jacket and trousers, less energy of the worker is spent on performance than with ordinary clothing close to special or overalls.

The outfit of the suit, the design of its elements should take into account the various situations in which the worker may find himself: temperature changes, the amount of precipitation, the possibility of...
injury, exposure to harmful production factors. Therefore, one of the most important requirements is the convenience of taking off and putting on the suit, the convenience of using the pockets. It is very important that the design of clothing does not hinder movement, does not interfere with air exchange in the underwear space.

Analysis of the literature [2-4,9-11] showed that a set of working clothes should include comfortable, interchangeable and easily assembled items: light jackets and trousers, insulated vests; semi – overalls and overalls, insulated jackets and trousers.

For winter working clothes, an additional requirement is made for heat-shielding properties, which are provided by the correct design of a working clothes set with the required level of thermal resistance of materials. It should also be noted that working clothes designed for winter types of work, taking into account wind exposure, should be as closed as possible (for example, overalls) to create a thermal insulation effect due to obstacles to the penetration of cold air into the underwear space.

Due to the thermal insulation properties of working clothes are largely determined by the mobility of the air enclosed in it entering the underwear space from the external environment, the thermal state of a person in all other things being equal will depend on the type of working clothes that affects the intensity of the outside air intake. Studies of physiological and hygienic indicators [5], characterizing the thermal insulation properties of various types of working clothes, have shown that the greatest thermal insulation effect has a set of clothing, which includes overalls. According to R.F. Afanasyeva [6] the thermal resistance of the jacket and trousers is 94.5%, the coat is 91.5% in relation to the thermal insulation properties of the overalls, which is due to the stronger insulation of the lower extremities. The bag of working clothes materials must be moisture-conductive in order to timely remove moisture from the underwear space, which can form because of intense physical activity usually inherent in a worker. To prevent a sharp cooling of the body, the materials of the working clothes set, while absorbing water vapor and droplet-liquid moisture, must slowly release it when drying out into the external environment [7].

4. Conclusions and recommendations
Therefore, the design of special-purpose clothing is a multifunctional task and it is necessary to impose increased hygiene requirements on it, which can be formulated as follows:

- Reliable protection of the human body from dust, dirt and mechanical influences during labor.
- Adjustable heat-shielding ability of working clothes and compliance with the conditions of wear, as well as the intensity of work.
- Adjustable air permeability of working clothes and its compliance with specific operating conditions.
- Overalls must be impervious to moisture (soil and atmospheric) to be worn outdoors.
- Moisture (sweat) generated during the period of increased physical activity of a person should be removed from the skin through working clothes, and working clothes adjacent to the skin should remain dry, i.e. it is necessary to provide for the ventilation of the underwear space (removal of moisture vapor and carbon dioxide released through the skin).
- Cut of working clothes should ensure the freedom of various movements of a person, without restricting breathing and blood circulation, be as light and soft as possible.

Along with this, working clothes must meet aesthetic, technical, and economic requirements, which, together with hygienic ones, create a complex of various factors that ensure the ergonomic design of clothing. Thus, the fulfillment of a complex of technical, economic, hygienic and aesthetic and requirements for clothing in accordance with its purpose and operating conditions provides reliable protection.

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