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ANALYSIS OF CHILDREN'S WINTER OUTERWEAR PRODUCTION REQUIREMENTS

Nazarova Matluba Abdurashid qizi

Head of the Department of “Design” of Namangan State Technical University, PhD. Associate
Professor

matluba.nazarova91@gmail.com

+998941538447

Musayeva Gulshanoy Qahramon qizi

Supporting doctoral student of the Department of “Design” of Namangan State Technical
University

musayevagulshanoy@gmail.com

+998999192296

Mirzaraximova Sayyora Mirzaabdullo qizi

mirzarakhimoff@gmail.com

+998936901622

Abstract. This article explores the critical aspects of selecting and applying technological processes in the production of winter outerwear for children. Such garments must effectively protect children from cold and damp environmental conditions, retain body heat, and ensure freedom of movement. To fully meet these functional requirements, the use of modern materials—such as synthetic insulation (e.g., sintepon, hollofan) and membrane-coated fabrics—as well as advanced sewing technologies is essential. The study analyzes the main stages of the production process, including material selection, garment design and construction, sewing techniques, and final finishing procedures. Moreover, the article scientifically examines the relationship between technological choices and product quality, durability, and ergonomic performance. The findings are presented in the form of practical recommendations for manufacturers specializing in children's clothing.

Keywords: children's clothing, winter outerwear, production technology, sewing process, material selection, heat retention technologies, waterproof coatings, environmental safety, ergonomic design, quality control, modern textile materials, hygiene requirements in children's wear, functional garments, thermoregulation, sewing equipment.

Introduction: The children's clothing industry is undergoing continuous development, with growing demands for both functional and aesthetic quality. In particular, the production of winter apparel for children requires special attention, not only to design and appearance, but also to comfort and protective functions. Winter outerwear plays a vital role in shielding children from cold weather, ensuring warmth, and maintaining comfort during outdoor activities in harsh climates. This article investigates the essential factors that must be considered in the production of winter outerwear for children, with an emphasis on both practical and scientific aspects of garment development. Given the increased vulnerability of children to cold-related illnesses, such as respiratory infections and weakened immune responses, it is crucial to design clothing that ensures comprehensive thermal protection. Key Features of Winter Outerwear for Children winter garments for children serve a unique and critical purpose in cold climates. Exposure to low temperatures can lead to health complications, making it imperative to prioritize specific features in the design and production of these garments. These include:

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Aesthetic appeal and comfortable design – A child's winter garment must not only be protective but also attractive and ergonomically designed to encourage regular use.

Functionality and safety – The clothing should support freedom of movement, incorporate insulating and waterproof materials, and meet hygiene and safety standards specific to children's needs.

These aspects represent the foundational requirements for creating winter outerwear that is both effective and appealing, thus forming the basis for the subsequent analysis presented in this study.

Materials and Methods. Fabrics and Manufacturing Technologies Winter clothing for children must fulfill dual requirements: providing protection against external cold and ensuring the retention of body heat. To achieve this, garments are constructed using specialized thermal insulation materials, including both synthetic and natural fabrics, faux fur linings, and advanced heat-retaining textiles. These materials are selected based on their ability to maintain warmth while allowing breathability and comfort.

Thermal Insulation. Clothing designed for cold weather must not only shield the body from low temperatures but also effectively preserve internal heat. This is accomplished through the use of insulating layers composed of synthetic fibers (e.g., polyester-based insulation like sintepon or hollofan) and natural materials, which create air pockets that reduce heat loss. Faux fur linings and membrane-based fabrics are also commonly used to enhance thermal efficiency and resist wind and moisture penetration. Because children are highly active and constantly growing, their garments must be lightweight, flexible, and non-restrictive. Heavy or stiff winter clothing can impede movement and negatively affect physical activity. Therefore, the weight and structure of the clothing are critical factors influencing muscular activity and freedom of motion. Proper selection of lightweight, ergonomically designed garments helps reduce unnecessary load on the body and supports efficient, comfortable movement during physical activity. The integration of lightweight insulation materials and elastic fabrics contributes significantly to overall garment performance. In our daily lives, the clothing we wear not only enhances a person's external appearance but also regulates the body's heat transfer and provides protection against various weather conditions, external pollutants, and mechanical damage [1]. When properly selected, clothing and footwear serve as essential means for individuals to adapt to environmental conditions and offer critical mechanical and physiological protection.

Results. One of the most critical requirements for children's clothing is safety. To ensure this, numerous regulatory documents have been established in our country to govern all processes from production to the end consumer. All manufacturers are required to demonstrate that their garments comply with relevant standards and requirements prior to market release, proving that the products are safe for children and do not pose any harm.

According to current legislation, the requirements for the production and sale of children's clothing in accordance with international standards are outlined in TR CU 007/2011. Compliance with this document is verified through certification or declaration procedures. The sewing of children's clothing can be organized in accordance with current national standards, such as:

GOST 32119-2013: Products for newborns and preschool children. General technical specifications;

GOST 31409-2009: Knit outerwear for women and girls. General technical specifications;

GOST 31407-2009: Knit underwear for newborns and infants. General technical specifications.

Compliance with the sanitary regulations approved by the Chief State Sanitary Doctor of the Russian Federation on June 28, 2010 (Order No. 72) is mandatory for individuals, sole proprietors, and legal

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entities engaged in the production and/or sale of materials for children's and adult clothing, children's goods, and products (items) that come into contact with human skin [2].

Discussion. Sanitary regulations establish hygienic requirements for the organoleptic, physico-hygienic, sanitary-chemical, and toxicological-hygienic parameters of products (including clothing, children's goods, and items in contact with human skin) to prevent adverse effects on human health. These sanitary rules apply to the following categories:

a) **Products in contact with human skin:**

- Knitwear (clothing, socks, gloves, scarves, and headwear),
- Tailored goods (clothing, headwear, bedding),
- Textile products (towels, scarves, mattress covers, bedding, and similar items),
- Leather and fur products (clothing, headwear, gloves, belts, wigs, and related items),
- Suitcases, bags, handbags, and similar goods, including materials used in their production.

b) **Children's products:**

- Products for child care,
- Toys, including electronic toys,
- Footwear,
- School bags, briefcases, backpacks,
- Strollers and bicycles,
- School stationery,
- Printed books and other products of the publishing industry.
- The role of materials and technologies in the production of children's winter outerwear is unparalleled [3]. Below are the main materials and technologies used:

Protection and Water Resistance. Clothing must provide protection not only from cold but also from moisture. The use of specialized water-resistant materials, such as Gore-Tex or other synthetic fabrics, ensures the garments are waterproof and maintain dryness in wet conditions.

Safety. To ensure safety, garments should incorporate reflective elements on the front and back to improve children's visibility. Additionally, hazardous components such as small parts, loose buttons, or detachable decorations must be avoided to prevent choking or injury risks.

Thermal Materials. One of the most commonly used materials for children's winter clothing is synthetic thermal insulation. This category includes polyester, polyamide, microfiber, and fleece. These materials not only provide effective heat retention but are also relatively lightweight, contributing to greater comfort and ease of movement.

Fur Materials. For certain designs, natural materials such as fur or wool are used. These materials offer excellent thermal insulation; however, they tend to be heavier and may present challenges during use and maintenance.

Waterproof and Windproof Materials. The outer layer of winter garments often utilizes waterproof and wind-resistant fabrics. Specialized membrane materials like Gore-Tex protect clothing from adverse external weather conditions, ensuring dryness and wind protection.

Lightweight and Flexible Designs. The production of children's winter clothing increasingly incorporates lightweight and flexible materials, such as elastic fabrics and synthetic fibers, to enhance mobility despite the thickness of the outerwear.

The design of winter clothing, especially for children, must be both comfortable and aesthetically pleasing. Color, pattern, fabric texture, and overall appearance significantly influence children's

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mood and willingness to wear the garments. Bright colors, animated characters, animal motifs, and playful designs are commonly used to make children's clothing more attractive and engaging.



Design of Children's Clothing. Clothing design should be not only visually appealing but also functional, age-appropriate, and comfortable. For younger children, soft and cozy designs are prioritized to ensure comfort and ease of movement, whereas for older children, more fashion-oriented and sporty styles are developed to meet their preferences.

Outerwear — including coats, jackets, lightweight parkas, and other winter garments — must be particularly comfortable and functional for children. The following brands are recognized for their high-quality and innovative designs in this category:

The North Face — a brand known for producing durable, high-quality, and comfortable outerwear. Their children's collections primarily consist of winter jackets, parkas, and rain-resistant garments. The brand is especially renowned for its lightweight yet warm clothing, combining protection with ease of movement.

Columbia Sportswear produces high-quality children's outerwear designed for cold and rainy weather. Their jackets and coats are highly regarded for their excellent heat retention and freedom of movement.

Patagonia Kids manufactures eco-friendly and high-quality outerwear for children. Their jackets, coats, and parkas are made from durable materials that not only provide warmth but also ensure long-term use. Patagonia is also well-known for its commitment to environmental protection.

Moncler Kids is a brand of premium and luxury children's outerwear. It is particularly recognized for winter coats and parkas featuring modern and comfortable designs. Moncler combines high levels of comfort with elegance.

Nike Kids specializes in sports-oriented outerwear. Their children's jackets and parkas are not only comfortable but also aligned with current fashion trends. Nike products are typically made from high-quality, lightweight, and breathable materials.

Brands such as Zara Kids, Gap Kids, Uniqlo Kids, Benetton Kids, Land's End, Crockid, Bossa Nova, Lucky Child, Gulliver, Tony Tots, SUNxMOON, Puella, Loloclo, and Loom Knits have established their presence in the children's clothing market. Each brand is known for its high-quality, modern, and comfortable apparel. They produce a variety of children's clothing, including everyday wear, sportswear, winter garments, and others. Every brand has its unique style, yet all prioritize ensuring high quality to enhance both comfort and aesthetics in children's clothing.

Quality control in the production of children's clothing is of paramount importance. Garments are evaluated not only based on their appearance but must also meet the following quality requirements: Quality Materials. Materials used in children's clothing must be environmentally safe and non-irritating to the skin. The use of chemicals or allergenic substances in children's garments should be strictly avoided to ensure safety and comfort.

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Advanced Technologies. Clothing should not only protect against adverse external weather conditions but also be comfortable and lightweight. The use of technologically advanced materials and production processes enhances the overall quality of the garments.

Compliance with Safety Standards. Children's clothing must meet all safety requirements. This includes the presence of necessary reflective elements for visibility, appropriate buttons, zippers, and other details to ensure the wearer's safety.

Environmental Factors and Sustainability. Environmental considerations have become increasingly important in the production of children's clothing. The adoption of sustainable fashion practices, the use of eco-friendly materials, and the reduction of chemical usage during manufacturing are critical factors in responsible production.

Conclusion. The production process of children's winter outerwear requires consideration not only of fashion demands but also of children's health, comfort, safety, and environmental sustainability. Materials, design, technologies, and quality control are continuously evolving to meet changing requirements. Moreover, the use of eco-friendly materials and sustainable manufacturing practices ensures not only the future of the fashion industry but also safer and more efficient production of children's clothing.

The choice of technology in the manufacturing of children's winter outerwear plays a crucial role in ensuring product quality, functionality, and safety. Properly selected technological processes — including material cutting, sewing, layering of thermal insulation, finishing, and treatment — enhance the durability and comfort of the garments. In particular, working with coated fabrics, modern heat-retaining materials (such as syntepon, hollofan, izosoft), and waterproof membrane layers requires specialized sewing technologies. The application of automated equipment in technological approaches increases production efficiency and enables the creation of high-quality, ergonomic, and safe clothing for children. Therefore, manufacturers of children's clothing must consider modern technological approaches when selecting production technologies.

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