

**Pensamento inclusivo no design de moda: vestuário ergonômico e prático para idosos**  
**Inclusive thinking in fashion design: ergonomic and practical apparel for elderly**  
**Pensamiento inclusivo en diseño de moda: ropa ergonómica y práctica para personas mayores**

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## **Resumo**

O presente trabalho teve como objetivo propor a construção de dois produtos de vestuário com características ergonômicas, a ver: uma camiseta masculina e um vestido feminino. O estudo caracteriza-se por uma pesquisa exploratória, no qual abordou a respeito das necessidades dos idosos em relação ao vestuário e a sua interação corpo-movimento. Inicialmente, buscou-se compreender empaticamente através da análise visual de produtos de vestuário destinado a idosos, além de revisão bibliográfica exploratória para compreensão do

estado da arte da temática. A metodologia usada partiu dos conhecimentos fornecidos por Bernard Lobach e Mike Baxter, em suas propostas de desenvolvimento de produtos. Como resultado, chegou-se a um denominador comum passível de ser explorado: a gola. Assim, focou-se no desenvolvimento de uma gola que não os machuque e ao mesmo tempo propicie uma independência no ato motor de vestir e despir durante o uso de produtos de vestuário. Para a realização da gola prática, foram utilizadas as matérias-primas malha 100% algodão e a viscolycra, justificado a partir de suas propriedades de composição. A proposta do projeto é, portanto, proporcionar aos consumidores da terceira idade um produto que ofereça, de forma prática e inteligente, uma solução viável que dê autonomia para a vivência do idoso, à proporção que também consiga facilitar as ações de trabalho do seu cuidador.

**Palavras-chave:** Idoso; Gola prática; Conforto; Design centrado no humano; Ergonomia.

### **Abstract**

This work aimed to propose the construction of two clothing products with ergonomic characteristics, to be seen: a men's T-shirt and a women's dress. The study is characterized by exploratory research, in which it addressed the needs of the elderly to clothing and their body-movement interaction. Initially, we sought to empathically understand through the visual analysis of clothing products for the elderly, in addition to an exploratory bibliographic review to understand the state of the art of the subject. The methodology used started from the knowledge provided by Bernard Lobach and Mike Baxter, in their product development proposals. As a result, a common denominator that could be explored was reached: the collar. Thus, it focused on the development of a collar that does not hurt them and at the same time provides independence in the motor act of dressing and undressing when using clothing products. To make the practical collar, the raw materials were used 100% cotton and viscolycra, justified by their composition properties. The proposal of the project is, therefore, to provide consumers of third parties with a product that offers, practically and intelligently, a viable solution that gives autonomy to the experience of the elderly, to the extent that it is also able to facilitate the work actions of their caregiver.

**Keywords:** Elderly; Practical collar; Pomfort; Human-centered design; Ergonomics.

### **Resumen**

Este trabajo tuvo como objetivo proponer la construcción de dos productos de indumentaria con características ergonómicas, a la vista: una camiseta de hombre y un vestido de mujer. El estudio se caracteriza por una investigación exploratoria, en la que abordó las necesidades de

las personas mayores en relación con la ropa y su interacción cuerpo-movimiento. Inicialmente, se buscó comprender de manera empática a través del análisis visual de los productos de ropa para personas mayores, además de una revisión bibliográfica exploratoria para comprender el estado del arte del tema. La metodología utilizada partió de los conocimientos aportados por Bernard Lobach y Mike Baxter, en sus propuestas de desarrollo de productos. Como resultado, se llegó a un denominador común que se pudo explorar: el collar. Así, se enfocó en el desarrollo de un collar que no les lastime y al mismo tiempo les brinde independencia en el acto motor de vestirse y desvestirse al usar productos de confección. Para el práctico collar se utilizó materia prima, 100% algodón y viscolycra, justificado por sus propiedades de composición. La propuesta del proyecto es, por tanto, proporcionar a los consumidores de terceros un producto que ofrezca, de forma práctica e inteligente, una solución viable que dé autonomía a la experiencia de las personas mayores, en la medida en que también sea capaz de facilitar las acciones laborales de su cuidador.

**Palabras clave:** Anciano; Práctico collar; Comodidad; Diseño centrado en el ser humano; Ergonomía.

## 1. Introduction

According to the Brazilian Institute of Geography and Statistics (IBGE, 2019), currently, the life expectancy of the population is around 75 to 85 years, 45 years more than in the 20th century. Anyone aged 60 or over is considered elderly, and according to the survey released by the aforementioned institute in 2018, the number of the elderly population surpasses the mark of 13% of the population, more specifically 28 million individuals. Between 2012 and 2017, the number of new elderly people grew by 4.8 million new elderly people in five years, corresponding to an 18% growth in this age group, which has become increasingly representative in Brazil. Women are a significant majority in this group, with 16.9 million (56% of the elderly), while elderly men are 13.3 million (44% of the group). Thus, the data above indicate that the elderly population will triple by 2050, and then, this index should continue to grow (Brustolin, 2017; IBGE, 2019; Dantas et al., 2020).

According to Ballstaedt (2007, p. 11), the aging of the elderly Brazilian population will open space for the fashion segment, this will be possible, due to the values, behaviors, lifestyle and specific needs. Therefore, the aging phenomenon should not be ignored. Aging is a universal process, usually identified with the chronological issue, involving biological, psychological, and sociological aspects (Dantas et al., 2020a). Besides, the characteristics of

aging vary from individual to individual (within a given social group), even if exposed to the same environmental variables. The specificities of each human being put to the test the need to think about products that meet their needs.

Within this scenario, the stereotype regarding the elderly comes to the fore, because the current scenario is relevant, associating the young to the beautiful, making them characterize the old as out of use, that is, an old and out of fashion being. According to Ballstaedt (2007), even though the elderly segment is promising, modern western society in general has a still prejudiced view towards consumers of this age group. It is well known that prejudice against the elderly is still a reality in Brazil and the world, in which the elderly goes through several uncomfortable situations, being seen as incapable and outdated, poorly adapted to technological developments. According to Menegucci and Santos Filho (2010 apud Puccini, 2014, p. 02):

Research on clothing design shows that the focus on creating improved and ergonomic clothing is in children, young people, and adults. The creation and study of ergonomic products for elderly adults are almost non-existent, probably due to the lack of interest, concern, and knowledge that clothing companies have about this new audience that is beginning to grow in the new national fashion scene (Menegucci and Santos Filho, 2010 apud Puccini, 2014, p. 02, translated by us).

In this context, in the face of the adversities developed, the following idea came: to treat the needs and desires of the elderly public, developing a product, in which, be innovative, comfortable, excellent quality, resistant to sudden movements, offer well-being to society, and of course, at an affordable cost, both for production and for final purchase. Given this, it is proposed and justified the development of the industrial design of two pieces of clothing, one for the male audience and one for the female audience, both with a crossed collar that meets the requirements of the consumer groups of the elderly. Therefore, this project aims to develop a men's t-shirt and a women's dress with a functional collar, using a specific model, in which it has practical aspects of expanding the diameter of the collar itself.

It is worth mentioning that the functional collar does not change the basic design of a t-shirt, for example, it brings a harmony adopted by the public, one of them, elegance, in this way, the product treated in this work did not develop a product redesign, but he did appreciate the society's recognized form of the artifact. Therefore, a new product on the market with cost vs. benefit is extremely important, thus satisfying the needs of the researched public. The study consists of exploratory research through a bibliographic review, in which the results obtained were used to improve and strengthen strategies, to trace the nature of the products

and to conceive alternatives that can satisfy the desires, demands, and ambitions of the consuming public.

Therefore, this research is structured in development that includes the theoretical framework, market research, synthesis of the consumer universe, research of fashion content, definition of generating the content, generation of alternatives and selection of the best idea, definition of materials and technologies, usability and adequacy test, analysis of results and evaluation of the product and finally, final considerations, which presents a synthesis of the elements contained in the text of the work and their respective results.

## 2. Theoretical Framework

Ergonomics originates etymologically as starting from the word *ergonomos* which, in turn, comprises the combination of the word *ergo*, which corresponds to the activity or exercise of a certain action and, *nomos*, which is defined as law or norm. In this sense, it understands the science that studies the actions developed by the individual and their relationship of existence with the environment in which it is inserted and shared. Its existence is realized in two axes: product ergonomics and production ergonomics (Rebelo, 2004; Reinert, 2017).

With a more comprehensive focus on product ergonomics, it suggests design and artifact development practices that best meet consumers' ergonomic needs, being physical, physiological, and even psychological, as will be discussed in more detail below. To guarantee the effective and homogeneous application of ergonomics in these produced artifacts, its principles and needs were conceptualized in search of serving as a methodological guide and basic guidance for fashion designers and designers (Gonçalves, 2007).

In this sense, ergonomic design methods are observed in six main niches: I) ease of use, regarding the products being easy to handle, yet, in this universe, it includes the low need for energy expenditure in acts such as dressing and undressing, focus central to this project, since the elderly may have motor difficulties that are related to the types of materials used as closures in clothing products, such as zippers. Then, II) ease of maintenance, that is, understanding the easy reading of their functional particularities, as well as conservation, when thinking about this characteristic to the public of the elderly, it is important to understand the difficulties they face in reading information of conservation, ensuring that they understand and apply; concerning III) product safety, they serve to ensure that the products do

not present compositions in their materials or functions that can serve as a vector for aggression to the skin or the user's psychological during use or washing (Iida, 2005; Gobbi, Reis and Bossi, 2015; Rossi, 2016).

Still, comprising three more principles, IV) effectiveness, that is, the adaptation of the functions of the products to the users' expectations. Next, V) comfort, comprising well-being in human-product interaction, which can be seen from three perspectives, namely: physical, when in the user's relationship with the product; physiological, when dealing with the thermal conditions that the artifact offers; and, psychological, when it denotes a subjective comfort of the use of the artifact towards the environment that inserts it, sociological, cultural and contextual. About VI) usability, it discusses the need to think about using the product as satisfactory, through effective, efficient, and comfortable points of view (Iida, 2005; Gobbi, Reis and Bossi, 2015; Rossi, 2016).

Finally, authors like Rosa (2008) insert another principle in this composition, calling it the principle of pleasantness, being more widely related to fashion products and the consumption axis, because it is precisely about reaching the expectations raised by the public's mind consumer target, whether they are technical, to their construction, or, mainly, from the perspective of the visual-aesthetic configuration of the worked artifacts.

In this sense, it is understood that the harmonious union of all these principles leads to an idea of theoretical ergonomics effectively applied. Versing and discussing in a more specific and in-depth way, product ergonomics for the elderly is seen much more as a market need, empathic and important, since the population grows exponentially and will represent about ¼ of the Brazilian population only in the year 2045, according to the IGBE, institute mentioned in the introduction (2019). The vast majority of the literature present in the area so far usually discusses the development of products focused on these users or the existing discussions of the dynamics of the artifact-ergonomics-user relationship, since they need specific adaptations that are treated, discussed and applied in suggestions of product prototypes.

Dalsin, Schemes, and Giuliano (2019), more contemporary, approach the perception of obese elderly women with clothing products, identifying a double socially constructed difficulty, however, the authors noticed the change in the scenario that starts from the base, that is, of people who suffer from these types of prejudices, as currently there are environments of empowered women who increasingly seek to retake their spaces in society and ensure that they are heard. In turn, it is up to designers and collaborators, as treated by Martins (2019), to take advantage of this market niche and take advantage of opportunities

based on new market trends, placing the user at the center of product development and ensuring that their needs are fully met.

### 3. Methodology

The research methodology is characterized as its nature as applied, as it aims to introduce technical knowledge for practical exploration in the fashion industry in the area of product development for the elderly. Concerning its approach, it is categorized as exploratory, as it discusses a little explored area, as well as a fully qualitative approach since individual perceptions are discussed in usability tests, subjective analyzes and product development, which in turn, does not involve the collection and analysis of relevant quantitative data (Gil, 2008; Muratovsky, 2016).

In terms of the technical procedures sought, the research will initially consist of a bibliographic review on the themes of inclusive fashion, product development for the elderly, as well as product design methods, absorbing and discussing everything concerning fashion and the possibilities these dynamics when applied to artifacts designed for the elderly. More specifically, the conceptual planning of the product will be conducted through the adaptation to 4 methodological steps of the devices of planning and product development proposed by Löbach (2001), in *Industrial Design*, and Baxter (2011), in *Product Design*.

Thus, the first stage of development suggested an initial composition followed by immersion in the universe of the target consumer audience, characterizing and defining it in the best possible way to each of its pertinent topics, such as the definition of antecedents of the product, identifying which artifacts are used to meet the same needs as what is being proposed in this work. The second stage consists of the conceptual project, bringing the creative stages, that is, the demarcation of the visual configuration that the product will have, more specifically about this work, also bringing the present fashion content (Löbach, 2001; Baxter, 2011).

In the third stage, the technical and material characteristics that the product will have in its construction are exposed, referring to the justifications for the choice of raw materials used and the sequence in which the product is built. Concerning the fourth and last stage, that is, the detailed design, the product is tested through a usability test with the consuming public for possible adjustments in its construction (Löbach, 2001; Baxter, 2011).

It is relevant to treat this whole process in detail, as it allows us to have a holistic view of design, covering all the needs that the product design demands, from marketing issues to end-users.

#### **4. Results and Discussions**

This research is the result of an undergraduate work developed in the discipline of integrating design in the Fashion Design course during the year of 2018.

The research intent of the research consisted of the design and subsequent production of a fashion product that would serve the elderly with a certain motor limitation. With that, it was decided to address the needs of the elderly to clothing and their body-movement interaction.

Market research was carried out, for knowledge and visual analysis of the garments that currently exist in the market available to the chosen public. Based on these researches, it was possible to define the type of product to be developed, as well as to plan in a justified way the aesthetic, symbolic, and practical qualities of the pragmatic dimension of the fashion product worked.

##### **4.1. Research and analysis of previous products**

Renfrew and Renfrew (2010, p. 15) explains that “with careful investigation and a good analysis of the competition, stylists can begin to identify a market segment and the specific customer for their fashion vision”. Thus, it was noticed that the target audience tends to consume a wide variety of pieces available on the market, in which, their needs are partially met, through the use of dresses, button shirts, among others. The feminine dress is considered the most popular garment for the elderly public, it offers comfort and it is possible to find it in different sizes and models. The button shirt is a classic for the male audience, with the front opening, it offers easy to wear.

Based on the market research carried out, it is noted that our competitors are companies focused on the manufacture of functional clothing. It was observed in companies that there are several products, but there is a shortage of them aimed at the public of the elderly. We mention Reapta, a clothing company that emerged to serve the adapted fashion sector, as it is not easy to find suitable clothes that provide greater comfort and improve the quality of life of the public studied. Reapta offers not only clothes but also accessories and



other objects that will facilitate care and/or serve as a support to accommodate equipment used and/or carried by patients in the postoperative period or long-term treatment.

**Figure 1:** Home Care dress.



Source: Reapta (<http://reapta.com.br/lojaonline/idosos/vestido-home-care>, 2017).

The Home Care dress (see Fig. 1) from the company Reapta was developed to make it easier to wear on a person with reduced mobility and who uses a gastrostomy tube. The dress has 100% cotton tricoline as raw material, with a small opening at the waist, on the left side for the gastrostomy tube and opening on the sides and closing with a pressure button, making the task of dressing much simpler, where, the piece can be purchased at [reapta.com.br](http://reapta.com.br) for R \$ 139.90 (one hundred and thirty-nine reais and ninety cents).

According to the market research developed, it was possible to observe that the competitor is indirect, since Reapta works only with female audiences, in the proportion that this work seeks to develop products for both genders. More specifically, through visual analysis, it was identified that the piece is intended for use in the hospital area, bringing a little modern and versatile design, leaving its limited use for other environments, however, in the year 2020, the production period of this work is no longer available for sale on the company's website.

**Figure 2:** Blouse in chiffon fabric, plaid print, and bow on the collar



Source: Sharysma (<https://br.pinterest.com/roupasadaptadas/>, 2017).

Another competitor would be Sharmisma, also characterized as a possible indirect competitor, a Brazilian brand specializing in clothing that, in addition to being aesthetically attractive, has its accentuated aspects of comfort (see Fig. 2). The brand had professionals specialized in the elderly and nurses to help them in the test at the consumer's residence and nothing more was charged for the service.

Sharisma launched its virtual store specializing in fashion for the elderly in 2009, and the first physical unit in 2011, in the city of São Paulo, in the state of São Paulo, Brazil. However, after years of market activity, the company went bankrupt, ceasing to operate in the market, which no longer configures it as an active competitor.

#### **4.2. Synthesis of the consumer's universe**

The consumer target audience treated in this work is composed of elderly baby boomers and/or traditionalists<sup>1</sup>, comprising both genders in separate products, Brazilian, with an age group of about 80 years of age or above, that is, primarily focused in retired people,

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<sup>1</sup> In the universe of this work, was used the notion proposed by Collistochi et al. (2012), where the authors state that traditionalists are those born until 1945, baby boomers comprise the years 1946 to 1964, Generation X goes from 1965 to 1979 and, finally, Generation Y would be people born from 1980, with reservations in the denomination of Generation Z and Alpha, which came soon after to define new temporal barriers, more contemporary and which are not of importance in this research.

inactive age, precisely by, according to Machado et al. (2016), being individuals with a more free and wide monetary power and consumption, since they no longer have the current need to spend with children. Concerning the following sets, fitting into a level of education that can vary from elementary education to higher education, which will require more projected and objective visual information in the developed artifact, as it seeks to serve people of all ages. levels of degree of understanding.

The social group in which this public is inserted is classified as C, that is, the recurring middle class, whose gross income is between R\$ 1,064.00 and R\$ 4,591.00, being a class that at the same time moves a high number of consumer credit (Scalon; Salata, 2012; Scamaruzo; Scheller, 2019). Mostly located in the region of the Seridó Potiguar, a semi-arid climate, with a predominance of high temperatures that belongs to the state of Rio Grande do Norte, inserted in the Northeast of Brazil. The public has needs due to their motor limitations, whether they are physical and/or sensory changes, a consequence of advancing age.

Thus, currently, in Brazil, little is invested in the elderly sector, even in the face of aging and, according to the data presented by IBGE (2019), the great increase in the population in the country in the coming years, it is noticed that fashion and the elderly remain socially vulnerable (Brustolin, 2017). In this regard, a market for new fashion products appears, emphasizing mainly aesthetic issues, as it continues to supply only needs such as comfort and practicality. Therefore, it is understood that the researched public lives in a world in which physical effort has significantly reduced, that is, the elderly end up needing products that facilitate their motor activities, reducing the time and energy available in simple activities (Gruber et al., 2017; Marteli, 2019).

The central public working on this product project has distinct aspects, both ethnic, cultural, musical and religious, thus, all of the elderly group already mentioned and discussed must be considered as potential consumers, thus occurring diversity, as it is an important and common set of differences and shared values in social life and each region. Among the specific characteristics of each region, the climate in the Northeast is another relevant factor, which in turn, the Seridó climate contains high temperatures and recurring and unexpected climatic variations, an environment that significantly interferes and shapes the comfort of clothes (Lucena et al., 2013; Dantas et al., 2020b). It is believed at first that the product developed in this research can adapt to the requirements since its aesthetic must follow certain visual configurations due to the aspects of the target audience and also to the symbolic associations agreed to the climate.

It is believed, in turn, in the development of a functional product, an article of ergonomic clothing, which is practical, which be able to provide freedom in movement, comfort, as well as a good performance so that the individual can develop his daily activities independently. An innovative product and at the same time that meets the needs of the target audience, needs of comfort, practicality, good fit, pleasant aesthetic look and affordable price for your world, thus supplying, through the men's t-shirt and a dressed female with collar crossed the scarcity present in the market.

### **4.3. Fashion content research**

The fashion trends chosen to compose the piece are inspired by two fashion shows. The first comprises the launch collection of the brand Boss for the Spring/Summer 2019 season, which took place on September 10, 2018, in New York City, United States. Containing the colors as a reference: deep burgundy, blue and yellow tones; silhouettes: the outline and/or the set of a fluid part; style: casual with a fluid sports footprint that combines comfort, modernity and a lot of charm; shapes: element that strategically adds a polychromatic visual aspect, bringing versatility to the look (see Fig. 3).

Another inspiration came from Lívia Cunha Campos's fashion show, called Beira, which took place at the São Paulo Fashion Week (SPFW) event on October 27, 2018, bringing Beira fashion through visual details. In its parade, it addresses clothing products that were not built on a different theme for each collection, but on the practicality of the piece, that is, focusing much more on the practical than the aesthetic aspects, as it unfolds and it creates new shapes from the need to make basic parts, such as a pit, a collar, a sleeve. It also highlights the decorative seams, developed from the functional sewing of the pieces that are molded while touches of tonic details in the fashion collection. After collecting the references, it was joined in a semantic panel that can be viewed in Figure 3 below:

**Figure 3:** Product semantic panel.



Source: Prepared by the authors.

The color combination consists of a timeless fashion that makes it possible to use it independently of the seasons. The public seeks comfortable clothes, but that is always within the trends, and consequently with the modern look meeting their needs, leaving aside the stereotypes that characterize the elderly as out of fashion and that is far from a certain standard imposed by society.

#### **4.4. Definition of the product's visual configuration**

The project proposes to develop a men's t-shirt and a women's dress with a double collar, a product that offers specific suitability in modeling to the target audience, especially about aspects of safety, comfort, the effectiveness of use, functionality, and operability in the face of daily activities, helping the elderly to dress and undress the garment with as little work as possible. In the practical aspect, the garment will have a crossed collar that will facilitate the passage of the individual's head in the act of dressing and undressing, and will also minimize the energy waste of those who need the help of a caregiver to dress. Dondis (2003, p. 22, translated by us) expresses that “any visual event is a form with content [...] influenced by the importance of the constituent parts, such as color, tone, texture, dimension, proportion and their compositional relations with the meaning”. In this sense, the piece will be made of cotton which, in turn, has the following design elements composing the syntax of its visual configuration:

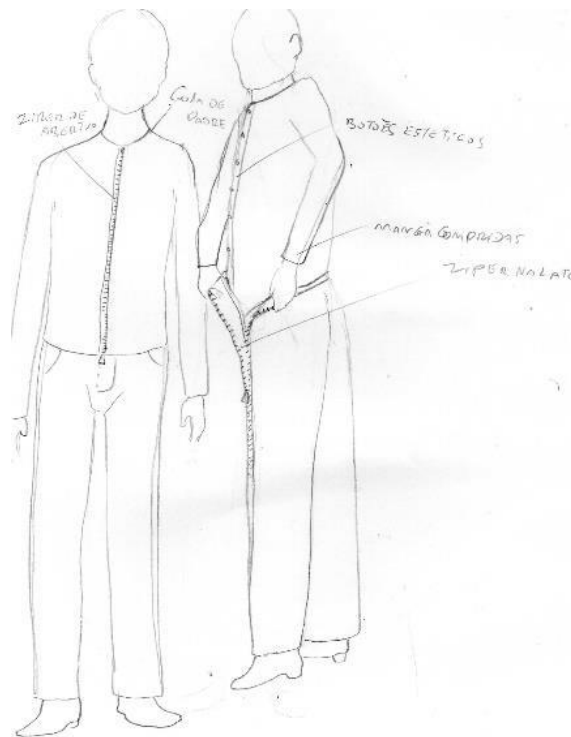
- Contrast: between the base colors, yellow and blue were used, as well as for the intermediate colors, red and white were used to create illusions of intensity, directing the eyes of the consuming public to certain specific points, that is, the crossed collar and evidencing its use through colors;
- Texture: characterized especially by the tactile perception provided by the fabric used;
- Balance: using colors and shapes that harmonize, this element was used to result in a visually harmonious, attractive and logical arrangement;
- Line: when combined with the other elements, it draws the public's attention, in organizing the space it gives direction to the look, thus increasing visual interest.

The fundamental principles of fashion design are applied to men's t-shirts and women's dresses basically in the approach of all elements: contrast, texture, balance, and line. Dondis (2003, p. 23, translated by us) completes his speech by arguing that “the toolbox of all visual communications are the basic elements, the compositional source of all types of materials and visual messages”. Both pieces developed to contain a strategic opening in the collar, with a collar that is crossed, with the union of the parts above that make up the shoulders, enabling functionality to the product. Regarding the basic colors used in the visual composition of the pieces, these comprised yellow, for the female product and blue, for the male product. These colors psychologically stimulate bodily feelings of calm, joy, and good humor, seeking to bring through this artifact of clothing the neurological potentiation of the mind of the consumer of outsourcing.

#### **4.5. Generation of alternatives and selection of the best idea**

Initially, it was proposed to develop a product for the male audience, it was thought about the creation of clothing that would facilitate their way of dressing, the initial idea was to develop pants that contain openings on the sides and zipper closures, which make it easier when be dressed (see Fig. 4).

**Figure 4:** Alternative ideas, pants with side openings.

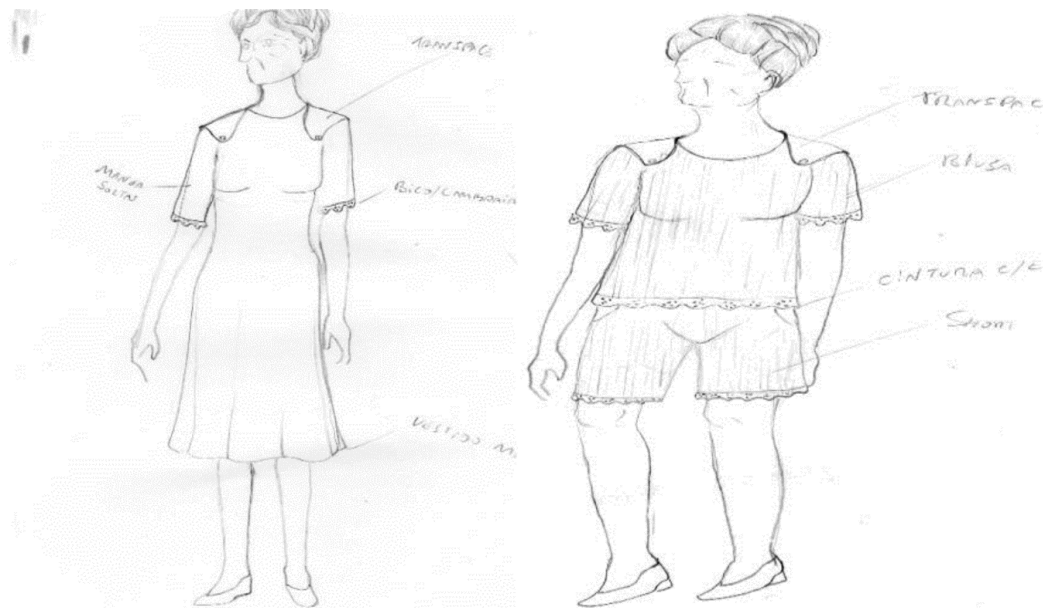


Source: Prepared by the authors

The material, at first, would be technological fabric with nanotechnology that is effective with insects, but the idea did not go ahead due to the results of the questionnaire applied, in which, the elderly reported in general that they prefer clothes without trims, they are: zipper, Velcro, and buttons.

Soon, the need arose to apply a questionnaire, with 20 (twenty) open and objective questions applied in the city of Caicó, in the state of Rio Grande do Norte, Brazil, on September 10, 2018, with a group of elderly people located in one of the neighborhoods of the city, as well as with professionals in the field, as elderly caregivers. The purpose of the questionnaire is to obtain aesthetic and functional information from the studied public. The application of the questionnaire followed all ethical guidelines of the scientific process, as well as the signing of the Free and Informed Consent Term (ICF), by both respondents and researchers, ensuring that respondents could interrupt the interrogation at any point. After collecting data extracted from the questionnaire, it was observed that the public would be of both sexes, from that, it was possible to define the best way to reach the desires and needs of the target audience (See Fig. 5).

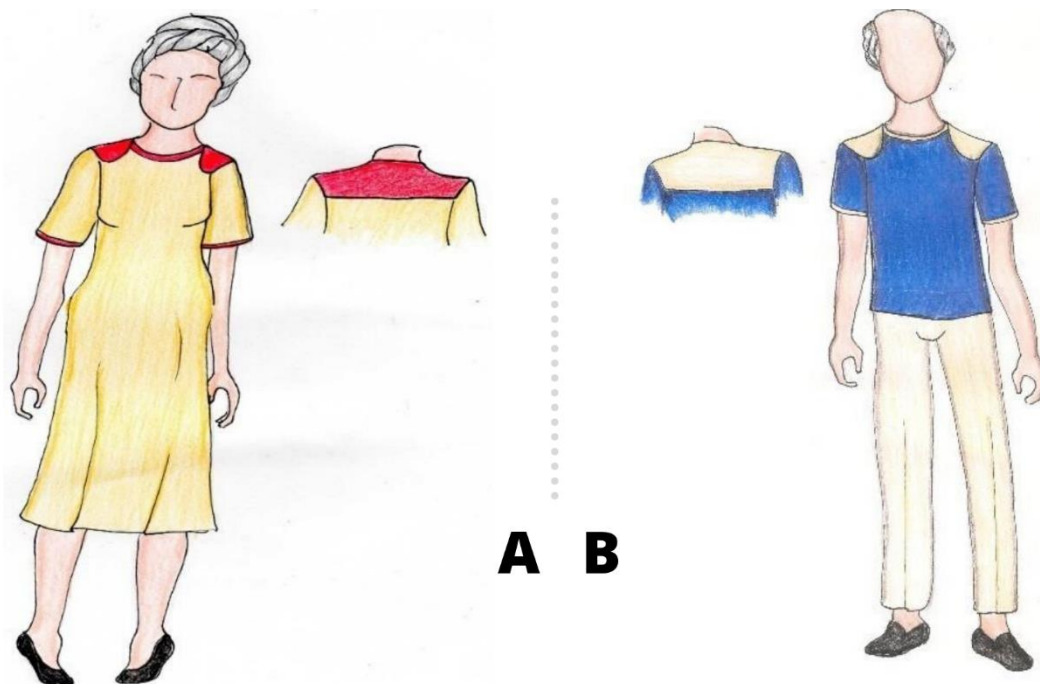
**Figure 5:** Initial sketches of the crossed collar applied to women's clothing.



Source: Prepared by the authors

In generating alternatives and selecting the best idea, it was tried to get to the main idea in the best possible way, thus, developing a dress and shirt that, in addition to comfort, aims to meet the needs and aesthetic values. Both products will be manufactured with raw material 100% cotton and with adaptations in conventional modeling together with the adjustable collar that fits the individuals in question (see Fig. 6).

**Figure 6:** Final design of the planned product, a) female and b) male



Source: Prepared by the authors



To meet the demands of the public, the removal of Velcro, buttons, and zippers was selected as an alternative, which, in addition to closing with the help of third parties, would cause discomfort for the elderly. For the solution of this discomfort, both in the dress and in the shirt, it was used the type of fabric called viscolycra, a raw material composed of elastane fiber with viscose thread, generating light and comfortable fabric. Therefore, after all the tests, Figure 6 are the drawings that best represent the best idea.

#### **4.6. Definition of materials and technology**

Two types of raw materials were used, namely: viscolycra and ribana. Viscolycra fabric was used for the front, back and sleeves, and the rib was used for the construction of practical collars. Regarding the operational sequence of construction of the clothing product, after the risk and cut stages, two sewing machines were used, one being the overlock and the other the coverstitch sewing machine. Shoulders should be sewn, both on the left and the right side, then fit the sleeves and sew the front and backside, then sew the sides. Finally, they must add the collars (ribanas) for better fixation and, thus, guarantee comfort. To obtain greater physical comfort, an elastic folding fabric was used on the collars (ribana), which serves as a tailpiece, following specific modeling, thus having the necessary characteristics for expansion.

#### **4.7. Usability test**

The usability test took place in the same week that the construction of the product prototype happened, exactly on November 28, 2018. Amid the discoveries during the process, both products significantly met the expectations expected, both about their usability in terms of physical, thermal, and psychological comfort. The modeling of the female dress (see Fig. 7) and the male shirt (see Fig. 8) were visually harmonious, the key point of the pieces, the crossed collar, opened significantly, according to the model, thus expanding the diameter of the collar.

**Figure 7:** Yellow and red women's dress product prototype



Source: Prepared by the authors

According to the Brazilian Technical Standards Association (ABNT), following the Brazilian Standard (NBR) 13377, the anthropometric measurements in size M, proposed in a standardized manner by NBR 16060, were used as a reference for the female dress, as a reference for the men's shirt, which, the reference measurements range from 42 to 44. The researchers involved choose to faithfully follow the principles established for the development of the product, thus, there were no changes to the colors, was used yellow and blue which, expressively, added visual value to the piece and, consequently, pleased the target audience.

**Figure 8:** Product prototype of a men's shirt in blue and white colors.



Source: Prepared by the authors.

Still, on November 28, 2018, tests were conducted directly with the elderly to analyze the possible flaws of the product about comfort and usability, and also, to obtain possible feedbacks on the products. The following terms have been described: a very simple outfit, the piece seems to be basic. When wearing the product, both elderly people were able to dress and undress without the help of third parties, that is, their caregivers, providing a certain degree of independence. In this case, the product is open to possible adjustments, such as the proportion of colors and mixture of materials and adding prints and making it more modern and appropriate, making adjustments, and/or adopting new design strategies.

#### **4.8. Results analysis**

The general objective of the product design is analyzed as satisfactorily concluded, once it is possible to build a feminine dress and a masculine shirt, practical, comfortable and innovative, with the application of the crossed collar. The product has ergonomic features, such as having a fair manufacturing price, being able to satisfy the requirements of the elderly consumer public. To minimize errors, there was product planning and construction of alternative ideas, as well as field research that served as a guide in the preparation of the chosen piece. Besides, thinking about product quality and comfort for the customer, quality tests were carried out with the elderly.

Regarding the aesthetic look, considered by the public to be somewhat basic, this item can be improved, such as the addition of suggestions from consumers, such as the increase in pockets, to the extent that it would not alter its primary function at all. Regarding the functional aspects, they comply with the planned and technical aspects, other textile materials can be chosen for the front, back, sleeves, and collar. In general, the product satisfies, meets, and pleases all applications: main, basic, and secondary.

## **5. Final Considerations**

The central point of the project was the development of two garments: a women's dress and a men's shirt, with features to serve the public of the elderly, as functional, practical, comfortable, aesthetic, and at a fair price. In this sense, to better meet the pre-established objectives, market opportunities, studies on competitors, and fashion content research were initially analyzed. Looking at similar products already on the market, some meet their respective features and structures. Therefore, the competitors are considered indirect, were mentioned as Reapta and Sharisma. Reapta develops adapted clothes and accessories, and Sharisma, its clothes are not available for purchase, because, after years of operation, the company went bankrupt, ceasing to operate in the market.

Through the synthesis of the consumer universe, the target audience was better evidenced, so that the product covers the public composed of elderly people of the baby boom generation, of both sexes, in an age group of 80 years or more. Therefore, the characteristics related to global trends in consumption and lifestyle were also pointed out, to increasingly delimit the public and our competitors, to manage innovation strategies and meet the needs and desires of the elderly. For product design, we used the principles of fashion design, such as contrast, textures, balance, and line, which, in turn, added value to the product with the adaptations of fashion trends. The selection of the best idea, about came from the range of alternatives generated, that relating to the available materials and technologies for the development of the product, there was the choice of a female dress and a male shirt, both with a functional collar.

Among the goals of this project, the overall objective was achieved. The results show that the needs: main, primary and secondary of the elderly public were met, since the construction of two ergonomic and innovative garments was accomplished, which through the functional collar, the diameter of the collar itself expands, in addition to the product has

resistance, and is comfortable and differentiates itself from the competitors for its specific modeling, as well as for the design, functionality, and price.

The importance of planning is emphasized, which gives the product greater chances of acceptance by a determined audience, as well as reacting to the fashion cycle for longer. The prototype development process was designed to minimize possible failures and reduce the chances of rejection by consumers, as well as thinking about profitability, quality of the part, and requirements stated in the questionnaire, one of them, the existence of comfort.

It is believed that this project did not present limitations, since, since the planning, acquisition of raw material, and in the sewing sector, there was enough time to carry out all the steps before the deadline, stipulated on December 4, 2018. Finally, concerning the practical collar, the specific model of piercing the upper part of the clothing, both in the male shirt and in the female dress, can be used to serve other audiences, because the collar, in contact with the neck, offers protection and it also serves as a finishing frame, thus, changes may occur so that future works may come to exist from this, as there is a shortage of articles aimed at fashion in the elderly.

For future research, one can explore the application of the same type of mechanism developed in different materials and models, emphasizing mainly the aesthetic qualities. Thus, it is identified that one can also think about the application of the semantic differential method to determine the perception that the product generates in consumers and observers, exploring in this way the symbolic dimension of the industrial design products.

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