

# APPLICATION OF THE INFORMATIONAL PHASE OF THE PROJECT ON THE DESIGN OF TOILETS FOR ELDERLY

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## ABSTRACT

*The increase in life expectancy of the Brazilian population has raised awareness about the importance of studying the needs and difficulties of elderly individuals in their everyday activities. Thus, the aim of this paper is to discuss the development of new products for bathroom and toilet environment - especially during the informational phase of the project. The study focused on elderly users needs and demands by analyzing: function, usage and ergonomic aspects of the products available in the market. For this purpose, a field survey was performed at the Oscar José Pithan Shelter, located in Santa Maria-RS. Direct observation and semi-structured interviews were used to understand and record the use of bathroom and toilet environment by the target audience. The research provided subsidies/support for the development of new products especially during the informational and conceptual project phases that indicated description for the Final Product Project.*

## KEYWORDS

*Design, Elderly, hygiene, Product Design, Project Phases.*

## 1. INTRODUCTION

Brazilian population presents a high rate of demographic aging, mostly due to the fall in mortality and natality. According to Brazilian Institute of Geography and Statistics (IBGE, 2010), between 1990 and 2010, the rate of populational aging has raised of 7,1% to 8,6%, and they estimate 13% in 2020. Rio Grande do Sul is the state with the highest rate of elderly, with 13,5% of Brazilian population. Thus, it is necessary to analyze the environment aiming accessibility, and develop products that consider elderly user needs and limitations.

A great part of the users, mainly the elderly, presents or will present mobility difficulties and high vulnerability to accidents. Therefore, it justifies the development of adequate environment and equipment.

Typical actions of the daily life for those who present any physical disability or motor difficulty can be extremely stressful and uncomfortable, essentially when the physical area do not respond to user needs. The goal of this research is to provide relevant information to the design of the toilet seat used by the elderly. For this, we identify characteristics of this public, such as weaknesses caused by aging. Moreover, we list design requirements within the informational product project phase, aiming new ways of designing.

## **2. LITERATURE REVIEW**

### **2.1 Weaknesses in the elderly**

Research of IPEA (Inequality and Poverty in Brazil) and IBGE (Social Indicators Synthesis) indicate an increasing of the aging rate in Brazilian population. The reasons are, the decline in mortality and fecundity, and the increase in life expectancy. These factors are contributing to a gradual increase in the participation of the elderly on population.

The growth rate of the population has been reducing. Given the current level of fertility, populational growth rate is estimated at 1.1%. As for the life expectancy, South region presents the highest (70.8 years) and the Northeast the lowest (65.5 years), with an average of 68.4 years for Brazilian population. Therefore, this evidence points out that Brazilian population is aging.

Thus, it is necessary to think how to delineate aging process that affects all, irrespective sex, color, origin or socioeconomic *status*. A meaningful way of finding solutions to improve the elderly lives can be through recognizing the aging changes. Moreover through designing environments and appropriate equipment for possible malfunctions and muscular atrophies.

### **2.2 The elderly and the use of toilet**

It is undeniable that, in old age, even simple tasks as self-care of the body, become difficult to perform without the aid of devices. Thus, Rodrigues (2008) states that these actions, when performed with difficulty, can be facilitated with specific products made especially to provide greater autonomy in everyday.

The personal hygiene usually occurs in the bathroom, an environment which is likely to accidents. This possibility is due to the humidity on the smooth surfaces of floor finishes. It is recommended to think about the adaptation of the environment as well as products designed to autonomy, which ensures greater quality of life for people with such difficulties.

### **2.3 Informational project in the product development project**

The Product Development Project (PDP) is characterized by systematic and gradual phases which permeates decision-making. Several authors contribute to the product project process. Project methodologies present tools focused on the developing product. The informational phase of the project is an early phase in PDP and has a range of terminologies, such as: comprehension of the need (Bonfim, Nagel and Rossi, 1977), study of viability (Back, 1983), analysis (Bonsiepe, 1984), product project specification (Pugh, 1991), project specification (Baxter, 1998), preparation phase (Löbach, 2001) and others. It is delimited through analyses performed to evaluate the possibilities of the future of the project. "the scope of this analysis depends on the range and the importance of the problem solution" (Löbach, 2001, p. 143).

From these surveys, analyzes will be done in order to generate requirements that will be used in the development of new product concepts. The analysis will be accomplished according to Baxter (1998) and Löbach (2001), because their relevance considering the target product.

#### **2.3.1 Market analysis**

It is also called by Löbach (2001) as synchronic analysis. It relates information about target products existing in the market, and afterwards transmit in product settings.

Through data collection of what exists in the market, we can evaluate characteristics that collaborate to the generation of new concepts, such as, ways of use, aesthetic and monetary value, target audience and other. The recognition of the current products also avoids the development of ideas that are already in the market. The market analysis can be carried out through photographic survey or collecting images in literature review. The images comparison provides the recognition of relevant characteristics towards the design concept.

### **2.3.2 Function analysis**

Facing the possibility of designing a new product, it is important to make the delineation and the detailing of the exerted functions. The same product will always have different functions, major and secondary, even if the latter are not as relevant.

This function detailing provides a broader view of the user manipulating the target product.

To Baxter (1998, p. 181) the function analysis "shows the designer how consumers use the product and can promote the appearance of interesting new concepts". The same author describes the function analysis as a "functional tree", in which the functions of a given product are listed in a decreasing degree of importance. This tree can be replaced for a table or a flowchart, since they can clearly draw a descriptive line of the product functions.

### **2.3.3 Use analysis**

Aiming to collect characteristics of the use of products, this analysis arises from observing the user manipulating such product. Thus, the observer must have discretion to not influence the normal operation of such task.

This analysis explores "the interaction between the product and its user, through observations and analyzes" (BAXTER, 1998, p. 178). The observations can be registered as photographic images, showing the task steps evolution during the use of a specific object.

## **3 METHODOLOGY**

This paper has developed through the following analysis: market, function, use and ergonomic. For this, we conducted a research with the target audience, focusing on the use of the toilet environment and the toilet seat. After this, it was made the requirement delimitation for the PDP of the toilets.

### **3.1 Target audience research**

This survey was carried out at the Dr. Oscar José Pithan Shelter in the city of Santa Maria, RS – Brazil. This is a philanthropic entity which is maintained with donations and food by volunteers and financial institutions. There are currently 49 elderly residents, which are nearly 60% women and 40% men. The adopted methodology for data collection was semi-structured interview and observation in the local of use.

The research public included the elderly residents, nurses and nursing auxiliaries. It was interviewed 26 people, which were 12 elderly women, 8 elderly men, 4 nurses and 2 auxiliaries.

In the seven shelter bathrooms, it was observed issues of safety, comfort, accessibility and usability, as the interaction of elderly with the adapted supporting equipment. This research was carried out in the morning, considering that the residents make their daily hygiene after breakfast.

### 3.2 Market analysis

Analyzing the toilets adapted to the elderly, which are available in the market, we found that the adjustments are done mainly in the seats and surroundings. This is due to enable the same toilet to be used by people without difficulties. Figure 1 presents adaptation examples to facilitate the use of toilet.



Figure 1: Adaptation in toilets for the elderly found in the market  
Font: Itajaí (2012)

Toilet number 1 has support of lateral bars with tubular metal and non-skid finishes. In number 2, there is an elevated seat with polymeric material. Number 3 has support of lateral bars and elevated seat. Finally, number 4 has an elevated seat with ergonomic improvement, that facilitates the seat removal and promotes a better posture, helping the person to keep the spine straight.

### 3.3 Function analysis

The unfold of the toilet functions was made according to Figure 2.

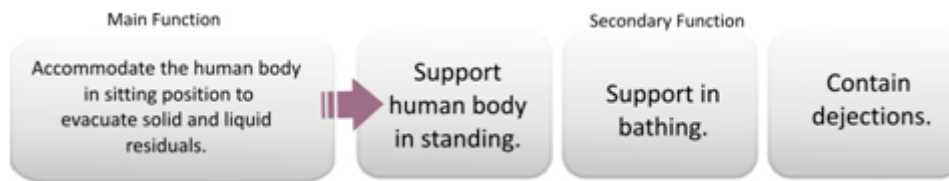


Figure 2: Unfold of the toilet functions.  
Font: authors

### 3.4 Use analysis

Through observations in Oscar José Pithan Shelter, it was found that there is great difficulty for elderly and caregivers in using the toilet.

The environmental conditions of the bathrooms can present danger because of the lack of non-skid flooring. Furthermore, in all seven bathrooms analyzed, there was no fixed seat for bathing. In addition to the small space for the toilet, its use is precarious.

Within these seven bathrooms, only two have suitable spaces for wheelchair users, one in the ladies, and another in the men's room. A positive aspect is the existence of support bars around the toilet and shower stall of all bathrooms, which provides assistance when sitting down, standing up and supporting.

Through interviews and observations of the use of toilet, we found that there is a need of a seat with an appropriate height for the users physical conditions.

### 3.5 Ergonomic analysis

Considering comfort and usability, we found a difficult situation in using the toilet, mainly because it is on a rung of cement, which cannot provide a height adjustment. As the elderly residents have different anthropometric measurements, the toilet was very high for some of them.

## 4 RESULTS

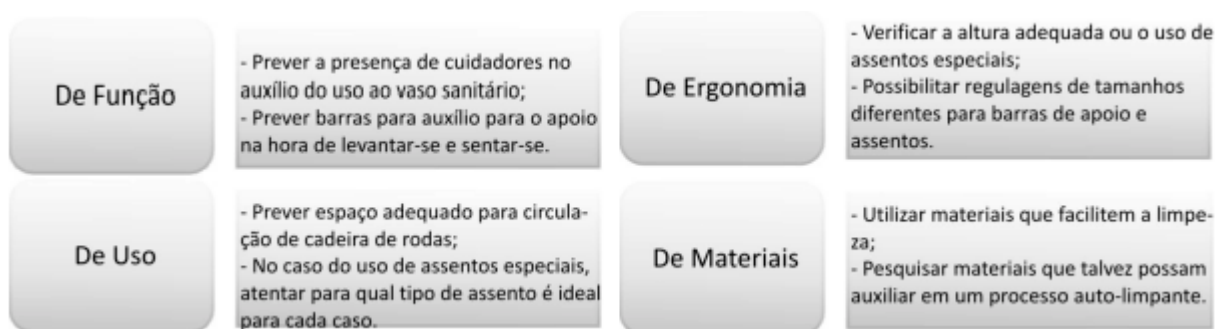
The market analysis indicates which types of adaptations are current in the toilets for elderly. We have noted that these adaptations occur basically in the seat and around the toilet. Moreover, the materials used in these adaptations are the same.

The same issue about the used materials can be pointed in the function analysis. In order to enhance the use of the toilet, it is important to adopt easy cleaning and comfortable materials for a better accommodation of the user.

The use analysis, performed by reading the observations and interviews carried out in the Oscar Pithan Shelter, demonstrates problems in the bathroom environment, specifically in the toilet and its surroundings. This could be understood as a threat to the elderly users of bathrooms without any adaptation. Necessities such as: a elevated seat, front opening in the seat for easy cleaning, non-skid floors and lateral bars were detected possibilities of configuration towards an ideal use of the toilet.

The ergonomic analysis was essential in identifying measure parameters to design adaptation of seats and its surroundings. We could state that the major difficulty of the elderly residents using the toilet when sitting down and standing up from de toilet. We also stated that their reduced muscular strength is hampered by the lack of height adjustment on toilet seats.

Considering all these, we can delimitate requirements to the design of toilet seats for the elderly, as Figure 3 presents:



**Figure 3: Requirements to the design of toilet seats for the elderly raised through analysis previewed in the informational project in the PDP.**  
Font: authors

## 5 CONCLUSION AND FINAL CONSIDERATIONS

Many researches can be done considering products for this public because the increasing demand of this population portion in the country. The autonomy in daily life activities can be supported by products and adaptations in the environments, which provides quality in the simpler daily life activities.

The analysis in the informational project provide a satisfactory view on the target product. We perceived the need of other analyzes to depth our product requirement guidelines such as, material analysis.

The created requirements serve as an initial point for the development of new concepts in the design of toilets, specifically toilet seats. Since it was found in the market analysis that adjustments in seats would be the most interesting solutions for this case. The authors expect a development growth of this type of product in order to facilitate the daily life activities for this public, which is lacking in specialized products.

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