Design applied to improve the quality of work life of scavengers

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Abstract

The first stage of recycling is selective collection, which separates and sends used materials to the retrieval process. Part of the process is completed by scavengers who walk around picking up paper, glass, plastic and metal thrown in the trash by the city population. Their wheelbarrows are often inappropriate for the current work place, usually residential streets, and do not fit the transported materials. In most cases they do not use any safety equipment. Our goal is to assist the population that lives from collection of recyclable items from residential garbage in the city, and make these collections less boring to them. Several people in Nova Lima, a city in the state of Minas Gerais, Brazil, derive their livelihood from this activity. Twenty one people, belonging to an association who collect waste paper as a source of income, were the subjects of this study. The project analyzes the working conditions of these professionals and identifies possible problems. These will serve as the basis for the development of work tools suitable for this activity to improve the quality of life of the scavengers and the population of the municipality.

KEYWORDS: Design, Scavengers, Innovation

Introduction

The world is passing through dramatic changes related to environment. The excessive production of waste is a problem that affects most countries in world and Brazil is not different. Much of the waste produced does not have certain destination, and usually ends up in landfills where tons of garbage pile up day after day, contributing to the pollution of ground and groundwater and the spread of disease among the population.

According to the department of Environment, Brazil produces an average of 90 million tons of garbage a year, and each Brazilian generates about 500 grams of garbage per day, reaching over 1 Kg, depending on location.

It is clear that there is a need for behavior change to minimize the environmental impact and reduce the shortage of resources. It is believed that the great challenge of this century is to find alternatives for sustainable development to offset the increase in consumption.

Given this reality, the design assumes a much greater role than commonly associated with it, object creation, and it begins to be used as a tool to facilitate the process of new product development. Manzini (2007) believes that the transformation towards sustainability should be understood as a learning process of society, enabling the designers to develop their skills and promote skills diffusion. The focus of design provides possible solutions that enhances the understanding of what is proposed and therefore fosters participation.

In Minas Gerais, a state located in the Southeast of Brazil, the Waste Treatment Centre is designed to receive all the garbage produced in the capital, Belo Horizonte. It receives 98,8 ton every month, which only 0,5% is used for recycling. This data shows how recycling in one of the biggest capitals in the country is not effective and does not cover the entire population. Recycling increases the quality of life and contributes to the preservation of the environment, reducing the exploitation of natural resources.

Nova Lima x Recycling

Recycling.

The industrial revolution began a process of intensified exploitation of natural resources to meet the growing demand for manufactured goods, accelerated by the exponential growth of world population. This process has established itself as a capitalist society, consequently there has been significant growth in the amount of waste produced, particularly in large urban centers.

Currently, one of the most viable alternatives to minimize these environmental impacts caused by urban waste is to reuse already industrially processed materials such as glass, plastic, metal and paper as raw material for making new products, a process known as recycling. Besides reducing the accumulation of trash, extending the life of landfills, this process aims to reduce the need for the exploitation of natural raw materials, minimizing the impacts resulting from this process.

The first stage of recycling is selective collection where the used materials are separated and sent to a retrieval process. The selective collection is done by collectors that walk around the city picking up paper, glass, plastic and metal thrown in the trash by the city population. They use work tools not appropriate for the things they carry. Besides that, some work tools are not designed to be used in cities, like human-powered vehicles and rubber sandals.

Figure 1: Scavengers and their work tools

Nova Lima

Nova Lima is a city located in Minas Gerais, that has about 80,000 inhabitants and is located 22Km (14 Miles) from Belo Horizonte, the state capital. Located in a land rich in minerals, the city grew, stimulated by the extraction of precious stones and even today the extraction of iron ore is its main economic activity. A group of 25 people use the activity of collecting recycling material as source of income, and they are part of the association called ASCAP.

Nova Lima is located in the hills called Serra da Calçada, which is very mountainous, with a variation up to 800 meters between the lowest point and the highest. This feature creates problems for the workers collecting materials, because they must walk through ups and downs to work. In contrast, this feature provides beautiful views and a pleasant climate.

Figure 2: Nova Lima city

ASCAP

ASCAP is the name of the association that collect, separate and sells recycling material in Nova Lima. The Association exists for ten years and has about 25 members who alternate in the services of collection and separation of recycled material as shown below:

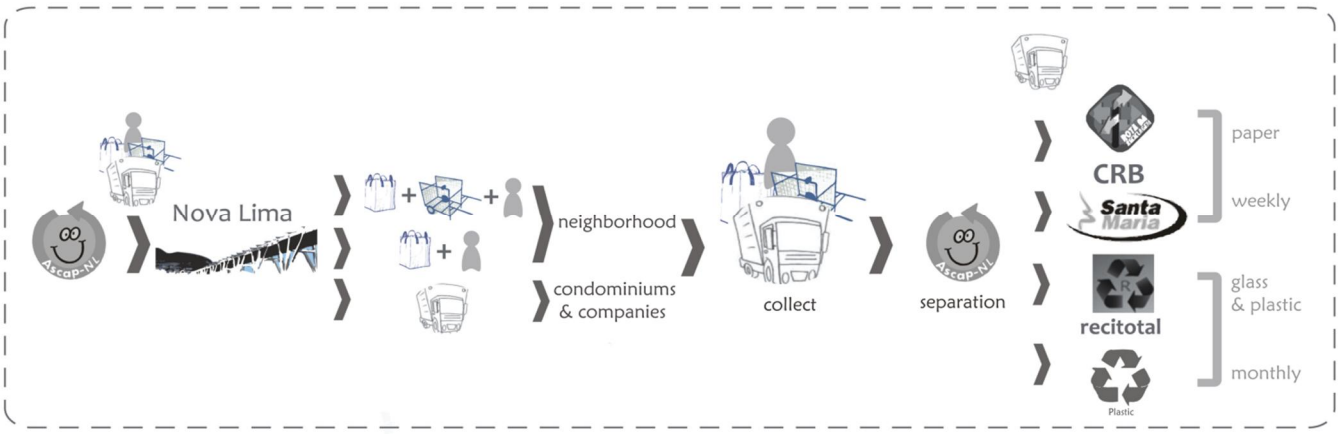

Figure 3: Value chain of ASCAP.

Daily, a group of collectors goes out of the house where the waste is stored to folow a predetermined route according to the day of the week and collect door to door the residues separated by residents. The collectors are divided into three groups: the first is formed by the scavengers leaving on foot, pulling big bags that are dragged from door to door. The second group carries those same big bags on carts of human traction, and normally circulates through the

downtown area, which is flatter. The third group goes in the end of the day in a truck picking up the bags left by the other two groups

Basically, the two groups that go with the bags collects all the residues and leave them at strategic points (squares, corners) to be collected by the truck in the evening and taken to the warehouse, where the residue is separated by type and stored until they are sold.

The warehouse has approximately 200 m², which is located in a lower part of the city. It has land used as a depot where the materials after being separated, are waiting for companies to buy them. This warehouse is separated from downtown by a hill, what hinders the work of the scavengers.

The association collects the work in two shifts, one in the morning and another later in the afternoon, but the sorting of materials is conducted all day, without stop. The price of each material is defined by the weight, and once the material is sold, the money is used to pay expenses such as fuel and maintenance of the machinery.

The remainder is divided equally among the members of the association, who usually receive a salary of R$ 800,00 per month. This reality means that the associates are mostly poor people. They have families, and its money comes from the work in the association. By working with discarded materials in a dirty environment, the collectors were not well regarded by the population, but the importance of their work becomes clear and the respect has increased.

Figure 4: ASCAP warehouse **1**

Figure 5: ASCAP warehouse **2**

Figure 6: ASCAP warehouse **3**

Figure 7: ASCAP headquarters and Nova Lima city

Method

After three months following the ASCAP members work, both in the street during collection or in the warehouse during the separation, we identified some aspects that require an intervention to optimize the whole system of management and production within the Association.

Starting with the site occupied by the Association, one realizes the lack of organization of the system of separation and storage of materials inside the shed provided by the local government, which directly affects the work efficiency of the associates. It is also possible to note, in that space, some variables ergonomically unfavorable to scavengers, such as the interior lighting inadequate for the type of work performed there, and reduced space for the amount of material collected and stored. In addition to the warehouse, the headquarters of ASCAP has an open space where materials already separated are stored in large bags, which are exposed to bad weather and vandalism by the population nearby.

The tools utilized by these collectors have some deficiencies such as lack of protective masks and gloves, essential items for safety and workers health preservation. As the president of the

Association said, these products are not used since there are no models able to adapt to the specific needs of collectors. In the case of gloves, they need to protect and not overheat their hands without compromising the agility of the members, particularly during the separation of materials.

The big bags, donated by businesses, are used to collect materials, are dragged through the streets of Nova Lima. These bags must be modified in way to have a system for better handling without sacrificing strength and main function

We must also consider external variables that affect the work efficiency of the collectors. The first deals with the hilly landscape of the city of Nova Lima, which demands great effort from scavengers to control their working tools, especially the human-powered vehicles. According to the president of ASCAP, the fact that these vehicles do not have brakes has caused some accidents with cars on city streets, endangering the safety of the worker and the general population. Another factor is related to weather, which, when rainy, considerably hinders the work of gathering in the streets. The rain can affect not only worker safety but also make some materials unusable, since when they become wet they lose commercial value.

In general, we intend to implement the design in each of the factors mentioned above, either for a redesign of products or for an improvement in the management of the collection, separation and storage of the material sold by ASCAP.

Results

From the analysis of the ASCAP members work, a mental map was designed (figure 16) to show the opportunities of product development in order to improve their work conditions.

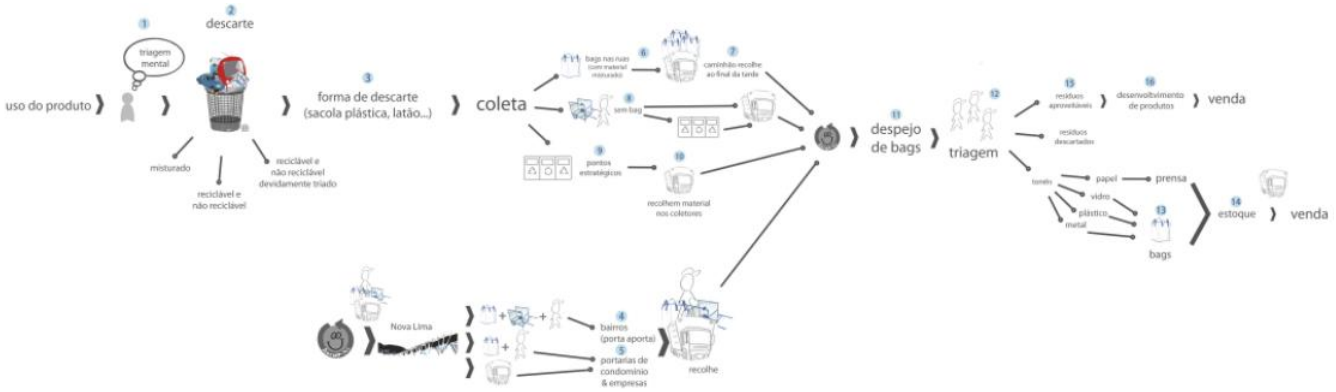

Figure 16: Mental map.

So, the research team realized that acting by simply modifying the products used and developing new to the same functions would not be enough to improve the scavengers work, as were major flaws in the collection system used by the association. This system is based around the work of scavengers, excluding the participation of the population and the city hall. In an ideal system of

selective collection, the population, the city hall and the scavengers should participate in the process.

Therefore, more than assist scavengers in their work, the products developed aimed to support the whole system of selective collection, considering and helping all parties involved.

The first product is for domestic trash, consisting of a modular structure responsible for supporting bags to be transported by citizens to the collectors. The modular structure can be organized in different ways, in order to fit different home spaces and be a practical product for everyone. Each module is in charge of storing a type of material.(fig 17)

Figure 17: Render 1

The collector is responsible for receiving the materials, separated and stored by the population to be subsequently removed by scavengers. They are divided into two parts and must be arranged in pairs. Inside each are two bags, commonly used today, held by supports to facilitate their replacement whenever they are full. (fif 18)

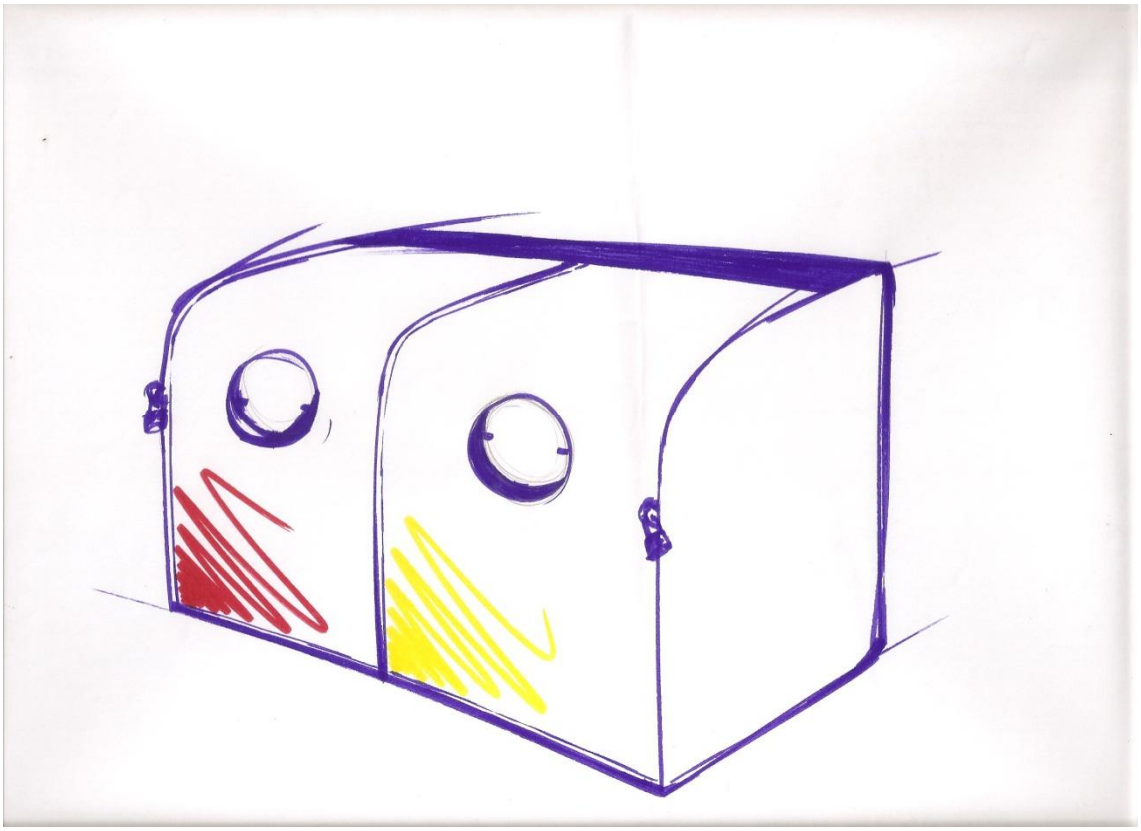

Figure 18: Render 2

To be sold, the materials must pass through a rigorous sorting in the factory, where they will be separated by types. The plastic for example, is divided into eight different types. To assist the association , four gloves have been developed, one for each type of material, because each one has a different feature such as one protects from the risk of cutting the hand from glass, other gloves enhance sensitivity for sorting paper. Therefore, each type of glove is made of a different material, and they are differentiated by color.(fig 19)

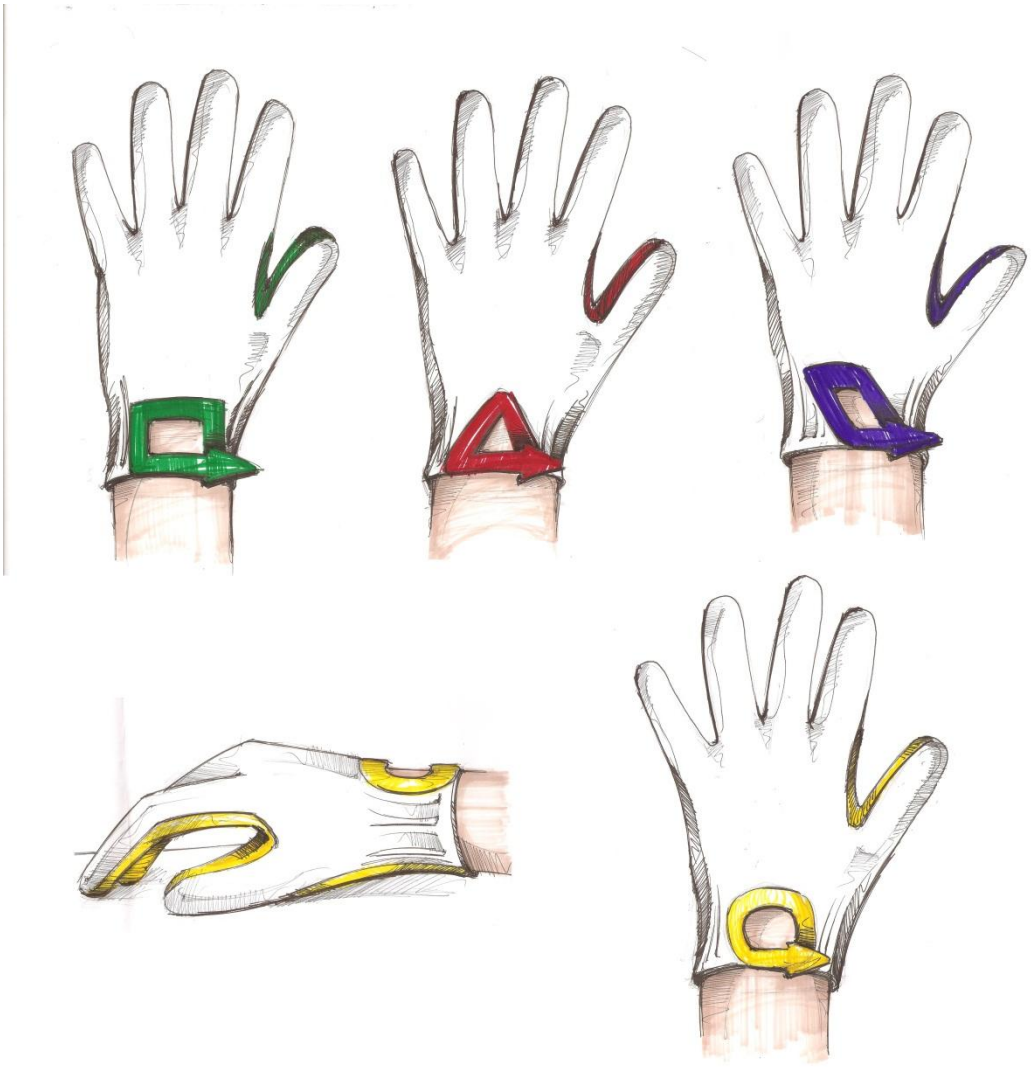

Figure 19: Render 3

The work in the factory was performed on the ground, so the need to develop a workstation that would facilitate the organization of elements in the factory was clear. The team developed a holder, which will keep the bag open a greater distance from the ground while smaller modules will receive the sorted waste.(fig 20)

Figure 20: Render 4

This way, the five products will work integrated, optimizing the process as a whole and improving the working conditions of ASCAP members.

In the coming months, prototypes will be fabricated and tested, to identify and correct possible failures.

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