

Multifunctional device for bicycles

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Abstract

This paper aims at designing a "Multifunctional device composed of load support and anti-theft lock for standard bicycles". A previous study has been developed in order to justify and validate the final design of the unmet needs of people in their daily lives, with an emphasis on satisfying those that imply specific savings, whether economic, energy or time.

As a result, the use of bicycles as a means of transport in Spain is promoted taking as a frame of reference countries such as the Netherlands or France. This means economic and energy savings (by replacing the car) and an improvement in people's health and quality of life.

Following the steps of the design methodology, once the need was detected, an information search was carried out in order to identify and prioritize the design specifications that meet the demands of potential customers. For this reason, various sources were used,

- Cyclelogistics (2013) [1], a European project that covers 11 countries and it helps to reduce energy use, as well as the emission of polluting gases into the atmosphere, regarding urban freight transport. For this purpose, it promotes the use of cargo bikes instead of motorized vehicles. According to available information, approximately 9 out of 10 commercial trips are potentially apt to be transported by bicycle, since 85% of commercial trips are related to the purchase of daily consumption supplies (food, toiletries, cleaning, etc.), another 10% is related to the purchase of less common goods (clothes, books, tools, etc.) and, finally, 5% of commercial journeys covers goods that are only bought once or twice a year (furniture, etc.) whose weight or size imply and compel the use of automobiles.
- Report "Food in Spain" by the Ministry of Agriculture, Food and Environment (2017) [2], in which it is shown the consumption per person over a year changes between 650 and 700 kg of food products, in the last 5 years. This means that a Spaniard consumes an average of 1.85 kg of food per day. To obtain the total of daily consumer goods expended per day by a person, other kind of products (cleaning, cleaning, pet care, utensils, etc.) that are consumed in smaller quantities and less frequently must be added up. The amount that has been estimated results in 250 g, that is to say, 0.25 kg per person per day. In total, a consumption of 2.1 kg per person per day is established as a basis. Afterwards, 15% dedicated to the container is added resulting in 2.4 kg. If this quantity is purchased weekly, there are 16, 8 kg of products per person. These data reinforce the possibility, even the recommendation, to use a bicycle for the weekly acquisition of consumer goods.
- Annual bicycle barometer developed by the DGT (Dirección General de Tráfico, 2017) [3] is a document that aims to know the opinion, habits and use that the Spanish people make of the bicycle and the needs and demands they have in relation to it. There are more than 18 million Spaniards who use the bicycle with some frequency and more and more people make use of it every day (20% use it at least once a week). The dominant profile among bicycle users is that of a young or active man, or student that resides mainly in municipalities of less than 10 thousand inhabitants. As study conclusions can be highlighted:
 - o Almost half of Spaniards between 12 and 79 years, 19 million, use the bicycle with some frequency and almost a quarter use it weekly.
 - o Since the first barometer, in 2009, the number of bike users has grown by 3.5 million.
 - o The use of bicycles in cities for daily commuting, going to work or school has increased.
 - o More than 85% of Spanish people agree that the reduction of environmental pollution must go through the increase in bicycle use.
 - o Citizens ask to promote the use of bicycles in companies and schools; more parking lots and adequate interurban connections.

The boost to use bicycles has allowed to establish a set of measurements and specifications in the design of the device with a double functionality, the transport of merchandise and an anti-theft system, as can be seen in figures 1 and 2.



Figure 1: Transport system



Figure 2: Safe system

In addition to meeting the needs of the client, the design must comply with a set of reference regulations both, at the level of security devices and the transport of merchandise at retail.

The result of the work has given rise to patent application with prior examination at a national level, in a first phase, and subsequently, at an international level.

References

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