



Maestría en Gestión e Innovación Tecnológica

Title

**Innovation in mechanical design
of a rehab hand brace**

Author

Mariana Tepox Cruz

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INNOVATION IN MECHANICAL DESIGN OF A REHAB HAND BRACE



Mariana Tepox Cruz

Maestría en Gestión e Innovación Tecnológica
Mariana.tepox@uppuebla.edu.mx

Tercer Carril del Ejido Serrano S/N, San Mateo Cuanalá, Juan C. Bonilla, Puebla, México

1. Introduction

In recent years it has been studied that Mexico ranks first in obesity, which is one of the most important reasons that result in a cardiovascular event causing heart attacks, Parkinson's disease, Huntington's, muscular dystrophy and generating various disorders such as the stiffness in various body limbs. What is muscular dystrophy is reflected in your hands? How would life with atrophied limbs. Hands are very important to perform daily tasks such as eating, dressing, and working for a person with muscular dystrophy is important to regain movement in the upper extremities, there are several alternatives such as: therapies, toxins, surgeries, automated equipment, orthotics static and dynamic. In this case the proposed design of an adjustable universal orthotic through the methodology of TRIZ (Theory for Solving Inventive) so that it is compatible with different types of people with muscular rigidity, regardless of gender is contemplated, or the country of origin.

2. Objectives

2.1. General objective

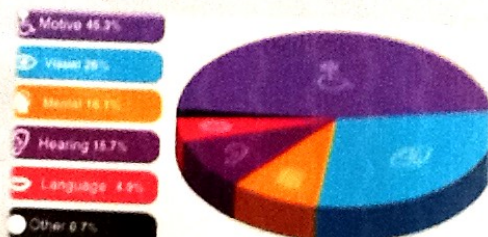
To innovate designing a hand rehabilitation orthosis for the treatment of patients with muscular dystrophy in the right upper limb through the TRIZ methodology.

2.2. Particular objectives

- To perform a technological surveillance to identify opportunities for implementing such a project in a specific sector in the market for people over 35 years.
- To designing an adjustable mechanism rehabilitative hand orthosis people with muscular dystrophy through the TRIZ methodology.
- To probing the degree of acceptance of the orthotic specialists and public, potentially the user to verify if the project is viable.

3. Justification

- In Mexico there are different types of disabilities,
- Most of these are motor disabilities,
- According to INEGI 45.3% of disabilities are driven, as shown in Figure 1.



Graphic 1. Statistics of disability in Mexico (INEGI , 2016)

According with FAO (United Nations Food and Agriculture Organization) in Mexico are:

- 2 billion people who suffer from one or more micronutrient deficiencies. 400 thousand millions more live overweight.
- 500 million are obese (first of obesity)

Likewise:
Measures hands are different depending on sex, gender and country of origin.

4. Method

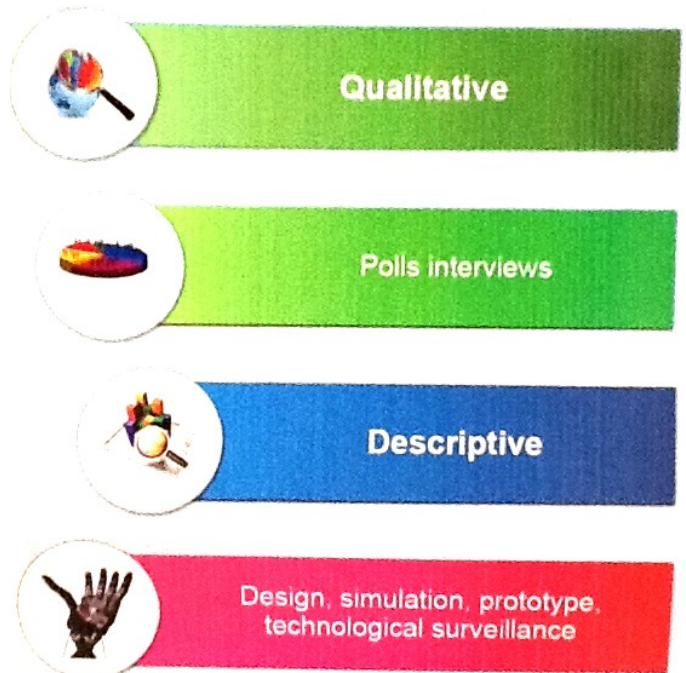


Figure 1 Methodology utilized in this research

Polls interviews

Interviews are conducted in different rehabilitation center spanning the private and public sector and potential users and doctors orthopedic specialists and physiotherapists



Figure 2 Surveys conducted in rehabilitation centers

First Prototype



Figure 3. Computer-aided design, with the Catia software Rehabilitative hand orthosis.

Technological Monitoring



Figure 4. Process technology watch.

5. Results

TECHNOLOGICAL SURVEILLANCE

- > Database
- > Patent Offices
- > Universities
- > Companies
- > Trade statistics for business development

The number of registered in various offices worldwide patents shown in Figure 5.

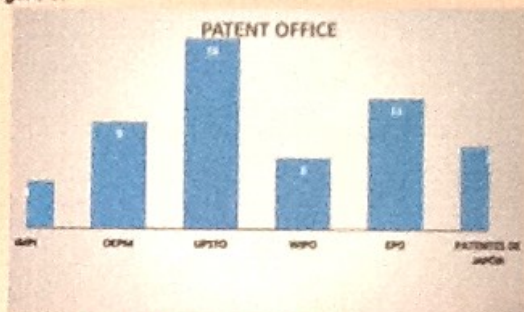


Figure 5. Patents registered in offices mundiales

DESIGN METHODOLOGY TRIZ

The following table shows the results obtained with TRIZ (Theory of Inventive Problem Solving) are displayed.



Figure 6. Application of TRIZ in rehabilitadora hand orthosis

POLL DEGREE OF SPECIALISTS AND USER AGREEMENT WITH POTENTIAL

The following table shows the results obtained with Theory of Inventive Problem Solving (TRIZ acronym in Spanish) are displayed.

Table 2. Questions posed to potential user

1 Do you know what a cardiovascular event is?	18	2
2 Do you know the disorders that can cause cardiovascular event?	16	4
3 Do you know what muscular dystrophy is?	17	3
4 Do you suffer from muscular dystrophy?	12	8
5 In case you need muscle rehabilitation, he prefers to take them home with the help of an orthotic or hospital?	18	2
6 Would you be willing to use the device presented?	20	0
7 Do you know what an orthotic is?	18	2

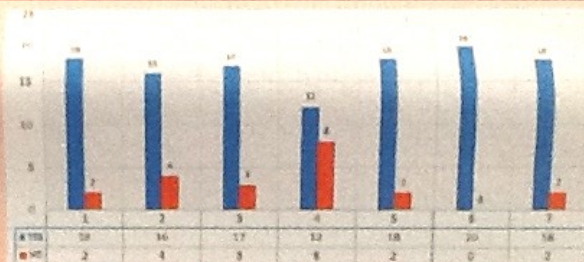
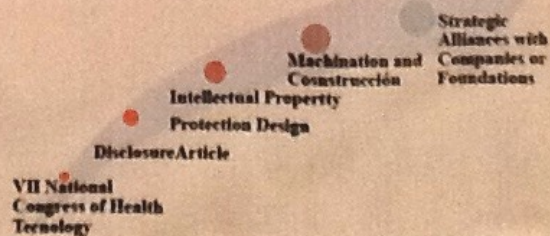


Figure 7. Interface people identification.

5. Conclusions

- > One of the most important techniques for creativity in the world of innovation is the TRIZ methodology and design it obtained meets the concepts of ideality.
- > Surveillance technology is vital because a study is obtained to analyze what is happening with orthopedic technology and new trends.
- > In the results of qualitative methodology potential users were studied by measuring the degree of acceptance with 90% of patients.
- > It aims to make intellectual property protection of the present design and machination of it through strategic alliances.

6. Perspectivas





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