

Innovative New Product Development Practice by Using Systematic Innovations

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Abstract—Idea Screening and Concept Development are the core parts of the New Product Development. The paper provides the alternative approach for Idea Screen and Concept Develop stages by using Systematic Innovation methods. The research addresses the real-world problem about the discomfort when people fall asleep in public places. The principles and concepts are discussed based on Systematic Innovation. It has been utilized in both analyzing the problem and proposing a viable solution to this dilemma and gives the guidelines to adapt into new product development innovatively.

Index Terms—New product development, systematic innovation, TRIZ, TIPS, product manufacturing.

I. INTRODUCTION

New product development (NPD) is the complete process of bringing a new product to market. A product is a set of benefits offered for exchange and can be tangible (that is, something physical you can touch) or intangible (like a service, experience, or belief). There are several stages for the whole NPD but Idea Screening and Concept Development is the core parts of the NPD. The paper provides the alternative approach for Idea Screen and Concept Develop stages by using Systematic Innovation methods. The paper gives the guidelines by using one of real-world case.

The group has observed that it is a common occurrence that when people of any age, race, or gender, sit in public places (like libraries, transportation terminals, and public transport) there is a tendency to feel drowsy and fall asleep. When they do fall asleep after trying to fight off sleepiness, finding a comfortable position is nearly impossible. Afterwards, the result of falling asleep in an awkward position causes great discomfort not only in the shoulders and back but most especially the neck. This discomfort is experienced not only during sleep but also when they wake up. The goal is ease the discomfort by providing a solution that addresses support for the neck.

II. PROBLEMS OF SLEEPING PILLOW

I have identified a lifestyle problem for PI course. I find it difficult to sleep while sitting on a chair in most of the public places like airports, trains, library, etc, where I'm often

forced to spend time. I do not only have the problem with the ergonomics of these chairs for sitting comfortably but also for neck support while sleeping.

Depending on my stress level for the day, I wish to sleep with my neck supported at the back or in front. For the seats with low back support it's not possible to support the neck either ways to sleep comfortably. As observed in public places, many people doze off with their necks falling from side to side which I find quite embarrassing and funny and therefore it prevents me from falling asleep. Though it is possible to carry pillows while travelling for long distance, it is often not handy to carry the same.

III. SYSTEMATIC INNOVATION

Systematic Innovation [1] is a structured process and set of practical tools anyone can use to create (or improve) products, process or services that deliver new value to customers. It is also a set of continuous evolving tools that will improve ability to solve the problems. TRIZ [2], [3] is the most powerful methods for systematic innovation methodologies. The substance-field model [4], [5] and 76 Inventive Standard [6]-[8] were conceptualized by the founding father of TRIZ, Genrich Altshuller [9]-[11]. The Standard Solutions are grouped by constraints, so they can help the specialists find appropriate solution concepts [11].

A. Problem Identifications

To analyze the problem more clearly, ENV model, Function Model and Root Cause Analysis (RCA) are applied. For the ENV model, we identified the current state of discomfort and defined "What I Want" state. The Element in our case is the neck and what we were searching for is the neck support. The present state is the discomfort that arises due to improper neck support at public waiting places like airport, railway stations and bus stations. The desired state is an extended neck support or an external device which can be used as a neck support.

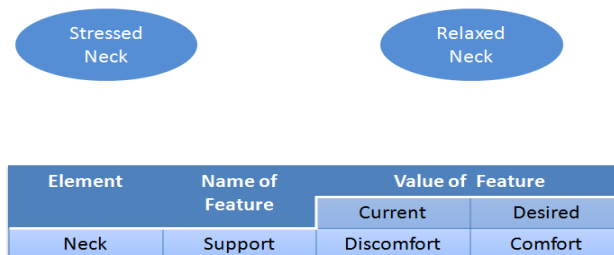


Fig. 1. ENV model.

The next step applies the problem into Function Model with defining the system. The system elements consist of

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three parts i.e super-system, system and subsystem. The super system in our case is human. As people wait for long hours at airports and railway station, invariably it happens that they fall asleep. The seats available at these places are good for sitting for few hours but not for long. Also different people have different height as well as different neck length; it becomes very uncomfortable to take even a small nap at these places. The system in our case is the chair which supports our neck and back. The subsystem is the seat, back support, joining rod and neck support (see the Fig. 2).

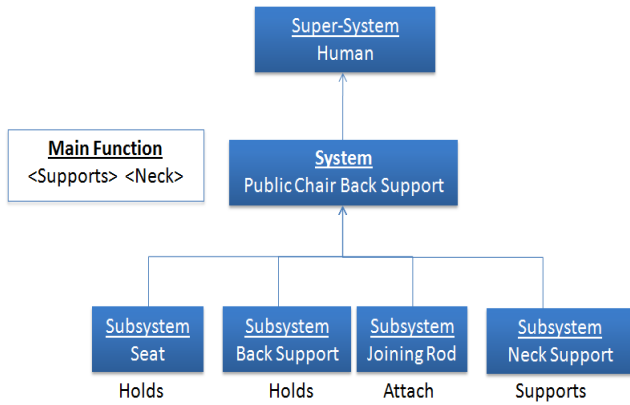


Fig. 2. System elements of new sleeping pillow.

The human is at the centre of the function model. The Support system is the parts of the chair. The seat supports the back support on which the human back is resting. The usual function should be a rod which should be joining the back support and extended to form a neck support. But this acts as an extra cost and there is no revenue earned from this service. Thus the companies are reluctant to give this extra support to rest the neck at these places.

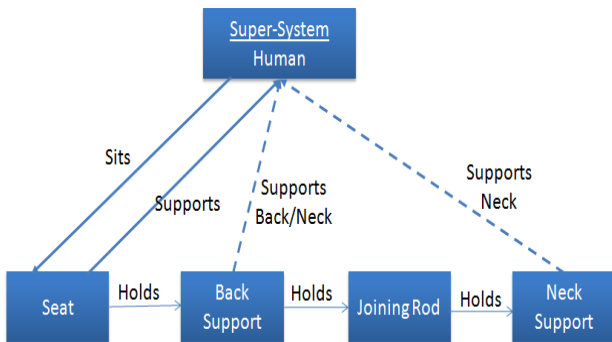


Fig. 3. Function model of the problem.

In the other hand, RCA (Root Cause Analysis) is designed to find the core problem from the original problem. Root cause analysis is a very important tool of identifying the defects in a system. The problem at hand is the painful/stressful neck. This is due to two problems namely uncomfortable neck support or no neck support in few cases. The uncomfortable neck support is due to four main reasons like material of neck support which is hard plastic or metal in some cases, inflexible neck support, which is usually not found in any public place. The shape of neck support can be another problem which may not fit on everybody's neck. Another problem is customer needs as different people have different neck length. The poor quality of neck support or no neck support is due to reluctance of service providers to

provide free service (see the Fig. 4).

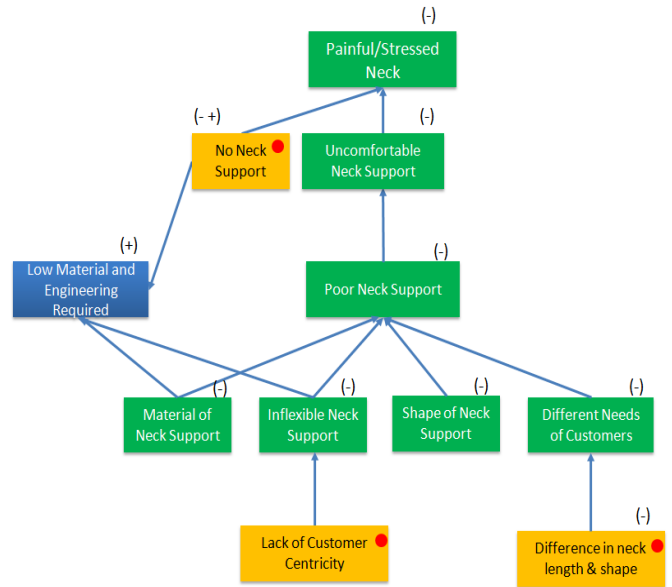


Fig. 4. Root cause analysis.

B. Problem Solving by Inventive Principles

TRIZ defines a set of 40 inventive principles and 39 system features that one typically wants to improve. The system that has the technical contradiction can be clarified based on the feature for improve and the feature for remove within a set of system features [11]. Originally, Altshuller reviewed patents in order to find out what kind of contradictions were resolved or dissolved by benchmark the patents that had been achieved. For the Altshuller matrix, we use adaptability as the parameter to improve and amount of substance as undesired result. The principles we used were local quality, physical or chemical properties and dynamism.

The technical parameters and the recommendations from the contradiction matrix from Altshuller [11] are:

- Improving Feature:** Adaptability (#35)
- Worsening Features:** Amount of substance (#26)
- Responding Inventive Principles:**

- No. 3: Local quality,
- No. 35: Physical or chemical properties,
- No. 15: Dynamism,

The Inventive Principle number 3 is chosen to remove the harmful effects and incorporate the current technology to develop new types of sleeping supporting device.

IV. CONCEPT DESIGN FOR SLEEPING PILLOW

Based on Inventive Principle 3 in Systematic Innovation Method from the previous session, the subsequent concept design is proposed. The final recommendation, as demonstrated in the figure below, is to come up with an adjustable joining rod that is light enough (made of carbon fiber) but still strong enough to provide support to the back all the way to the neck so that the neck is supported entirely. The Trimmed Function Model in Figure 6 demonstrates how this recommendation is arrived at. Since the solution would now be local and external, therefore there is no need of the subsystems mention in the dotted box (Fig. 5).

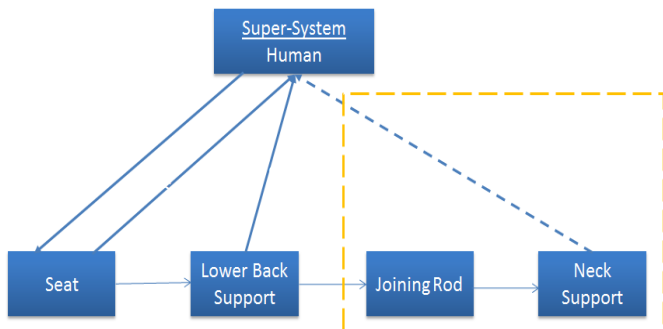


Fig. 5. Trimmed function model.

The final product, which is external to the super-system, is a replacement Joining Rod made of carbon fiber that can be adjusted. It will be retro-fitted with a strong outer material made of synthesized fiber of cloth and plastic so that it will be strong and light but also can be quickly inflated just by blowing through a blow-hole (like a balloon). When it is deflated, it can be folded like an umbrella. When inflated, it will look like a small back pack that a person can tie around their backs using a belt that wraps securely around their waist. This way, it is anchored on the person’s waist and provides support to the spine and the neck at the same time, thus providing the person with a comfortable way to sleep even when in a vertical position (like sitting in public places). Essentially, it will contain the following features:

- External support to the system (carbon fiber rod)
- Support from the lower back (from the waist)
- Adaptable (adjustable - can be lengthened or shortened)
- Air cushioning (inflatable, for added comfort)
- Can be deflated and folded as small as a folded umbrella.

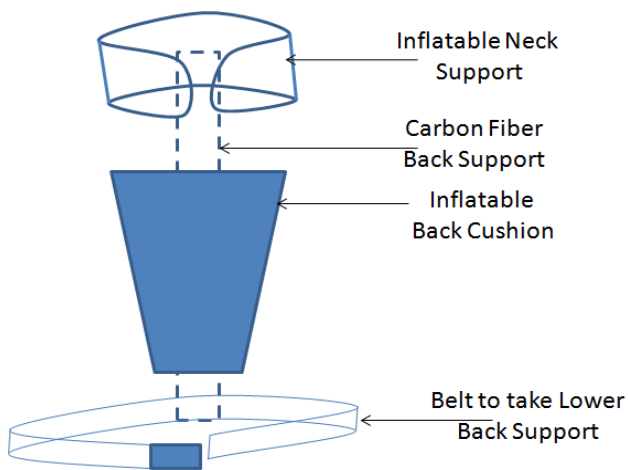


Fig. 6. Concept design of new pillow.

V. CONCLUSIONS

There are so many problems in the world that we can solve if people will be creative and passionate enough to make a dent in the larger scheme of things. This we can do without the use of sophisticated and expensive materials in order to improve and enhance the characteristic of certain equipment which has always been a part of our everyday lives.

The major target of this project is demonstrating the new concept of product development sequences based on Systematic Innovations. Even though the research is

dedicated with product development, the pattern of Systematic Innovation approach in the paper can be also applied to other industries.



Fig. 7. Proto-type design of new sleeping device.

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