Implementation Process of Low-end Disruptive Innovation based on OTSM-TRIZ

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Low-end disruptive innovation (LDI) and new-market disruptive innovation (NDI) are two types of disruptive innovation.

Low-end disruptive innovation (LDI) product characteristics: relative simplicity, cheapness, ease of use, convenience, high reliability, high efficiency and energy saving [1].
Prof Sun Jianguang (2012) proposed that low-end disruptive innovation is a branch of technological evolution curve in the mature stage. Because of the formation of this branch, the product has the capability of attracting low-end users, which makes the innovative product quickly form the market size and profit [2,3].
Background Analysis

Low-end disruptive innovation is different from new-market disruptive innovation. It's not a transition to the third dimension. It's a jump to the lower end in the original technical performance dimension [2,3]. Based on the analysis of technological evolution and technological system evolution, a product disruptive innovation process model is obtained [2,10]. In order to solve the multiple contradictions in the process of low-end disruptive innovation, by using Floyd algorithm, a low-end disruptive innovation implementation process model based on OTSM-TRIZ is proposed.
Design

List the current problems that relate to the characteristics. Remove the routine problems and form the analysis for the initial invention problems.

Create an initial problem table for low-end disruptive innovation products and transform the initial problem table into a network of product problems by using OTSM-TRIZ.

The low-end disruptive innovation process based on OTSM-TRIZ.
Each key problems is represented by a ENV model, analyze the underlying causes of these key problems.

1. All the ENV models are integrated together to build the network of contradictions for low-end disruptive innovation products.
2. The weight is the Comprehensive consideration of factors.
3. Contradictions is inversely proportional to the specific value, and the value is obtained from the set \{0,1,2,3,4,5,6,7,8,9,10\}.

An example of Floyd algorithm.

The elementary model of a contradiction [7].
The low-end disruptive innovation process based on OTSM-TRIZ.

According to the product control parameters and evaluation parameters in the network of parameters, redesign the product system, modify the system structure, and improve the current system through the operation of add or delete or replace.

The general network of parameters can be solved by the objective law of a certain field of knowledge, while the rest is solved by using the OTSM-TRIZ solution tool.
Case Study

Table 1. Problems and Partial solutions list.

<table>
<thead>
<tr>
<th>Pb or Ps ref.</th>
<th>Description</th>
<th>Pb or Ps ref.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pb1</td>
<td>Poor flexibility of battery flexibility</td>
<td>Pb9</td>
<td>Protection device is easy to break</td>
</tr>
<tr>
<td>Pb2</td>
<td>Poor flexibility of aluminium shell</td>
<td>Pb10</td>
<td>Voltage instability</td>
</tr>
<tr>
<td>Pb3</td>
<td>Use composite material</td>
<td>Pb11</td>
<td>Improve battery protection circuit</td>
</tr>
<tr>
<td>Pb4</td>
<td>Poor flexibility of electric core</td>
<td>Pb12</td>
<td>Battery safety</td>
</tr>
<tr>
<td>Pb5</td>
<td>Low utilization of space</td>
<td>Pb13</td>
<td>Independent small electric core</td>
</tr>
<tr>
<td>Pb6</td>
<td>Poor impact resistance</td>
<td>Pb14</td>
<td>High sealing requirements</td>
</tr>
<tr>
<td>Pb7</td>
<td>Add buffer material</td>
<td>Pb15</td>
<td>Battery overheating</td>
</tr>
<tr>
<td>Pb8</td>
<td>Custom battery shape</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Network of Problems.
Case Study

The network of contradictions for EP3.


The network of contradictions for EP8.

The network of contradictions for EP11.

Case Study

The network of contradictions is transformed into the corresponding network of parameters.

Each project is determined in sequence according to the priority level. Project evaluations are carried out one by one.

Until the project meets the requirements of the enterprise products. The most effective project is to set the flexible battery into a small power supply unit which is independent of each other.

The order of priority of different paths is obtained by calculation. CP1→CP4→CP15→EP13 is the optimal path.

Conclusion

Because the process model of disruptive technology that based on Classical TRIZ are rarely involved in resolving multiple contradictions, the basic flow chart based on OTSM-TRIZ is proposed.

The use of Floyd algorithm provides a direction for the programming of the model. The application process of this method is demonstrated by a case of smartphone flexible battery, which provides theoretical support for the further development and application of low-end disruptive innovation model.
References

Thank you!