Identifying the causes of problematic business process

Pavel Mikuš, Ing., Ph.D.
Departmen of Management and Marketing
Faculty of Education, in the Ružomberok
Nábrežie Jána Pavla II 15, O5801 Poprad,
pavel.mikus@ku.sk

The thematic unit: Management

Specific objective:

1. Identify the causes of non-standard products, suggest measures to the specific problem and develop strategic map of the organization,
2. Analyze the causes of this process in terms of finding and specifying the causes of damaged paint on the walls of the product using Ishikawa diagram,
3. Using FMEA specify the causes of discovered situation and possible consequences that would occur if they are not resolved.

Motivating questions:

1. Is it difficult to identify unequal process which has reduced the profits of the enterprise?
2. Which tools are appropriate for the analysis?
3. It is necessary to create a flow chart?
4. Why is it necessary to specify the possible consequences of the identified causes?

Syllabus:

1. Creating a flow chart
2. Ishikawa diagram locating causes of damaged paint the walls of the product
3. Analysis of the causes and consequences
4. Analysis of the force field for the implementation of the new technology
5. Table of strategic indicators
6. The strategic map DAP Slovakia

Abstract

This contribution deals with the analysis of production process of DAP Corporation focusing on the process of finding nonconforming process of particular product by processing flowchart of solution procedure for nonconforming process of production and parts. It analyzes the causes of this process in terms of finding and fixing the causes of damaged paint on the walls of product by Ishikawa diagram. Using FMEA the causes of determined status and possible consequences were stated, that could arise in case of not removing them. Organization name was changed.
Key words: analysis of production process, nonconforming process of production, analyses of causes and consequences.

Introduction
DAP Corporation is the leading international producer and seller of household appliances with the annual sells over 11 billion USD, employing 68 thousand people and with almost 50 production and development centers all over the world. Headquarters is located in USA, Benton Harbor, Michigan. Whirlpool Corporation has got 4 regional groups for household appliances: DAP North America, DAP Europe, DAP Asia and DAP Latin America.
DAP Slovakia is part of DAP Corporation and belongs to DAP Europe group. Head office is in Comerio, Seveno, Italy. In recent years organization has faced the sales decline and the company reached a state of recession. It was discovered that up to 35% of sales decline comes from the presence of non-standard products.
The aim, therefore, was to identify the causes of non-standard production appearance, to design the measure for given problem and develop strategic map of organization.

Flowchart
Processes in manufacturing processes are very complex. Some processes take place simultaneously and stand side by side in parallel and others follow each other. Most processes are so complex; that they need to be split to individual steps and only then some occurring relations are understandable. This is the case of DAP Slovakia Corporation, so the effort was to set aside only part of process, which solves the procedure with the problem occurrence with nonconforming product or parts. The defective paint on the walls of the machine is determined as the failure of nonconforming product.
The output of production is the subject to final inspection, if the product meets all the criteria it continues to warehouse and then to dispatch. The finding of nonconforming products leads to the designation, if the nonconformity repeats in 5 items in a row; the production line is shut down. The problem is identified and the conveyor, on which the goods are in the process of production, is checked in order to find the approximate point of nonconformity origin. At the same time the parts are checked during the processed operation. If the failure is in the process, the nonconforming process is analyzed involving maintenance department and technical department. If the failure is detected in technological equipment and it is not possible to repair it, technical department will place the request to purchase and after approval it is bought. The whole procedure is shown on the picture below.
Picture 1 Flowchart of resolving procedure of nonconforming process of production and parts
Ishikawa diagram locating causes of damaged walls coating of the product

The most frequently recurring bug causing nonconformity of product is defected wall painting. This is a serious mistake which elimination is costly and time consuming. The causes of the origin were searched through a brainstorming and on its basis the Ishikawa diagram was created. It is shown on the picture below. Brainstorming method was used for the processing of causes and consequences diagram. The result of it is the opinion that the failure of the wall painting can be caused by influence of 4 areas.

Picture 2 Ishikawa diagram of causes and consequences of defected painting the DAP Corporation

**In seeking the causes of this error, we focused on the following areas:**

**People** – one of the causes of damaged painting in improper manipulation with the washing machine walls at the end of assembly. This unprofessional work is reflected in the walls for moving trucks of walls (trucks with brackets for wall insertion), which occurs sporadically hitting of trucks between each other. We came to believe that just these blows of trucks mostly contribute to damage of wall paintings. It is due to the fact that there was a heavy shock vibration that can cause peeling of painting from the outside wall of the machine. The quality of the coating is affected by the ability of workers in the paint shop when they do degreasing of metal and spraying the machine walls and ultimately the very quality of coating is affected by responsible approach of each worker who handles with the walls.
Material – color quality affects mainly the mechanical properties but also chemical consumption. While the chemical composition is affected by manufacturer, its mechanical properties are affected by the preparation and the way of coating, the time interval of drying and repeated spraying and whether any of these processes is not according to production and technological processes.

Environment – is another area, which ultimately affects mechanical properties of color. Humidity of air which is used for drying of coating affects the speed of the drying. In case the color is not sufficiently dried, it may cause color bleed, or peeling and the wall must be repeatedly sprayed. The important is the warm air flow to evenly dry the painting.

Technology – manipulation with the washing machine walls is rather difficult from press mill, paint shop, warehouse, and manufacturing process to final assembly, but also manipulation with finished products up to delivery to customer. Resistance of the coating against these processes is inadequate. Labor intensity in the technological processes causes excessive manipulation with the machine walls.

Recommended action:
- People – we recommend increasing the control of the walls handling after spraying, focusing mainly on the transport trucks handling at the final assembly. The department of control should make increased control of walls handling, but the production department must be responsible for the work of their subordinates, which should train the workers adequately.
- Manufacturing environment – it is necessary to ensure the increase the number of humidity and temperature controls in the paint shop. The department of painting should be responsible for the implementation of this rule.
- Material – we recommend reviewing the possibility of transmission to new color which will have better mechanical properties. It is necessary to get the statement about the currently used colors from the construction department. We recommend increasing the number of periodic tests of mechanical colors properties.
- Technology – we recommend reviewing of the way of machine walls paintings and complex technology of paint shop. Technical service is responsible.

Since Ishikawa diagram it is not possible to determine how to solve the problems, using it we have only analyzed this problem. In order to find efficient and proper solution of analyzed problem it is necessary to use other tools: FMEA for implementation of new technology to analyze the force field and not least to make a table of strategic indicators. For finishing of the problem solving strategic map of DAP Slovakia was created.

The FMEA analyses shows that the probability of errors is very high, because errors arising during the process, can occur only after some time and thus they increase the risk of nonconforming product for early detection. The current technology is not suitable considering the resistance of coating. As suitable solution of occurred problem it is necessary to make a change of powder coating technology. 5 production steps are done during the technology process. After pre-preparation the base layer is applied and burned, another layer and its double-firing ensure that 25 up to 40 micron cover painting is created. Such created product meets the requirements and resists to handling abrasions and vibrations.

Savings: less workload/ reduction of manufacturing steps / saving of 4 employees of paint shop.
<table>
<thead>
<tr>
<th>Process/Product:</th>
<th>Error manifestation</th>
<th>Results of errors</th>
<th>Causes of errors</th>
<th>Measurement control</th>
<th>Occurrence</th>
<th>Merit</th>
<th>Detection</th>
<th>MR/P</th>
<th>Súčasný stav</th>
<th>Recomended action</th>
<th>Responsibility</th>
<th>Improved status</th>
<th>Implementati on of final action (date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spray</td>
<td>Damage coating</td>
<td>Peeling</td>
<td>Technological process failure</td>
<td>Supervisor controls</td>
<td>5</td>
<td>8</td>
<td>5</td>
<td>120</td>
<td>Technology change</td>
<td>Ing. F. TÚ</td>
<td>12.05.2012</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 2 Analysis of the force field for the implementation of new technology

<table>
<thead>
<tr>
<th>Item n.:</th>
<th>Positive powers</th>
<th>Negative powers</th>
<th>Valuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>New technology</td>
<td>It is enough to by new spraying guns, high costs</td>
<td>0.2</td>
</tr>
<tr>
<td>2.</td>
<td>Increase customer satisfaction</td>
<td>No big number of claims</td>
<td>0.3</td>
</tr>
<tr>
<td>3.</td>
<td>Redeployment</td>
<td>Improved respirators</td>
<td>0.05</td>
</tr>
<tr>
<td>4.</td>
<td>Space saving</td>
<td>Sufficient</td>
<td>0.05</td>
</tr>
<tr>
<td>5.</td>
<td>Less steps in process</td>
<td>Re-valuation of processes</td>
<td>0.1</td>
</tr>
<tr>
<td>6.</td>
<td>Reduction of work force in press mill</td>
<td>Deterioration in relations</td>
<td>0.1</td>
</tr>
<tr>
<td>7.</td>
<td>Increasing product resistance</td>
<td>New kind of colors</td>
<td>0.15</td>
</tr>
<tr>
<td>8.</td>
<td>Increased adhesion</td>
<td>Improvement of the quality of degreasing of metal</td>
<td>0.05</td>
</tr>
</tbody>
</table>

|            | Amount | 1,00   |

**Resulting actions:**

Reasons for supporting the implementation of new technology have more power and according to this fact management should implement the new technology.
## Table 3 Strategic indicators

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Trainings</th>
<th>Communication</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Casual indicators:</strong> Good interpersonal relationships, innovation suggestions, careers, fin.ratings</td>
<td><strong>Casual indicators:</strong> Education improvement</td>
<td><strong>Casual indicators:</strong> Communication between supervisor and subordinate</td>
<td><strong>Casual indicators:</strong> Extended horizon</td>
</tr>
<tr>
<td><strong>Follow up indicators:</strong> Satisfaction Index, the number of process improvements</td>
<td><strong>Follow up indicators:</strong> number of trained workers</td>
<td><strong>Follow up indicators:</strong> relationship improvement</td>
<td><strong>Follow up indicators:</strong> Transfer of knowledge</td>
</tr>
<tr>
<td><strong>Advertisement</strong></td>
<td><strong>Achievement of operational excellence</strong></td>
<td><strong>Achieving growth through innovation</strong></td>
<td><strong>New technologies</strong></td>
</tr>
<tr>
<td><strong>Casual indicators:</strong> Promotions</td>
<td><strong>Casual indicators:</strong> Professionalism</td>
<td><strong>Casual indicators:</strong> New types of machines</td>
<td><strong>Casual indicators:</strong> New working practices</td>
</tr>
<tr>
<td><strong>Follow up indicators:</strong> Increase of image</td>
<td><strong>Follow up indicators:</strong> Productivity increase</td>
<td><strong>Follow up indicators:</strong> ratios</td>
<td><strong>Follow up indicators:</strong> Investments costs</td>
</tr>
<tr>
<td><strong>Customer perspective</strong></td>
<td><strong>Customer acquisitions</strong></td>
<td><strong>Casual indicators:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Casual indicators:</strong> Customer relationships, claims</td>
<td><strong>Casual indicators:</strong> Activities of sales managers</td>
<td><strong>Casual indicators:</strong> Increasing work flexibility</td>
<td><strong>Casual indicators:</strong> Efficiency, business formation</td>
</tr>
<tr>
<td><strong>Follow up indicators:</strong> Number of claims</td>
<td><strong>Follow up indicators:</strong> Market research</td>
<td><strong>Follow up indicators:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Increasing revenues</strong></td>
<td><strong>Cost cutting</strong></td>
<td><strong>EVA</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Casual indicators:</strong> Acquiring new customers</td>
<td><strong>Casual indicators:</strong> Compliance with the efficient management department</td>
<td><strong>Casual indicators:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Follow up indicators:</strong> Growth turnover</td>
<td><strong>Follow up indicators:</strong> Effective management</td>
<td><strong>Follow up indicators:</strong> Meeting the sales plan</td>
<td><strong>Follow up indicators:</strong> Index of compliance with maturity</td>
</tr>
</tbody>
</table>
A competitive business with high quality products, professional staff and approach to Excellence

Financial perspective
- Increasing revenues from the sales
- Cost reduction, performance management of departments
- Meeting the expectations from previous planning period

Customer perspective
- Customer satisfaction, customer relations, product quality
- Operational excellence achievement, new techniques and methods of improvements
- Speed of deliveries

Perspective processes internal
- Advertisement promotions
- Operational excellence achievement, new techniques and methods of improvements
- Innovations in design, as well as in energetic class
- New Technologies, working processes

Perspective of learning and growth
- Employees motivation and preparation of conditions
- Educations and trainings to remedy deficiencies in knowledge
- Effective communication supervisor - subordinates
- Professional development of staff

Picture 3 Strategic map of DAP Slovakia
From the above analyses we conclude that the main problem and causes of nonconforming products stem from the unhealthy technological process and hence the risk of the late detection of defects that may occur after delivery of the product to potential customers.

As the optimal solution appears to be the introduction of the new technology of backed powder coating, where in return on investment is within 3 years, while reducing of the paint shop stuff.

In current process of coating the departments made the control and therefore, the better solution seems to be empowering the quality department and assignment of the control process to paint shop.

Considering the lower demand and loss of some customers, it is necessary to strengthen the marketing department in order to create new products that would once again convince the customer about the high quality and expertise of our employees and thus enhance the marketability of the brand.

Literature