Quality Improvement Using Model-Based and Integrated Process Improvement (MIPI) Methodology

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ABSTRACT

Industry environment is not just to meet customer requirement, but also to run their business effectively and efficiently in order to face the global competition. Although there are many methods have been developed, practitioner still finds difficulties when implement the methods. MIPI (Model-based and Integrated Process Improvement) by Sola Adesola and Tim Baines showed a holistic, structured and procedural guidance for improving business processes.

MIPI is developed by reviewing and analysing current methodologies and selecting a few frameworks against key performance indicators. By using MIPI methodology, industry not only can identify non value added activities in their processes but also can align with organization vision and mission. Hence, practitioners can have structured steps which are consistent and efficient when improving business process.

Case study taken on hatchery produced Days Old Chicks (DOC) which identify business needs and problem areas using pareto chart shows that small and weak DOC is the highest rank (39%). As-Is Process Mapping also conducted to capture current business process architecture. Using Cause and Effect Diagram and Failure Mode and Effect Analysis (FMEA) organization can identify that improper heater control in hatchery machine is the main problem (Risk Priority Number : 36). Action plan created in to a matrix as road map for process improvement plan.

Key words: MIPI, Seven Procedural Steps, Performance Indicator, Quality Improvement and FMEA

1. INTRODUCTION

Growing and competitive industries creating high quality product or services as a compulsory requirement. While in the other side, company also requires to effectively and efficient in order to face dynamic business changes.

In order to survive in such environment, reviewing, evaluating and develop plans for improving business process performance is a must thing to do. These activities called Business Process Improvement (BPI).

Business Process Improvement (BPI) can be recognizing as an organized and planned business activity improvement methodology.

Business Process Improvement is a structural approach to analyze and continuously improve company activity by focusing on waste elimination and bureaucratic.

Under big BPI umbrella there are three common strategy and activity adopted by organization: Continuous Process Improvement (CPI), Business Process Re-Engineering (BPR) and Business Process Benchmarking. Although there are many method of BPI has been developed, practitioner still found difficulties when implement the methods. MIPI (Model-based and Integrated Process Improvement), a BPI method created by Sola Adesola and Tim Baines as a result from doctorate research showed a holistic, structured and procedural guidance for improving business processes.

Research conducted resulting on identifying company’s criteria and target to improve its business process performance.

2. RESEARCH METHODOLOGY

Model-Based and Integrated Process Improvement (MIPI) methodology is a Business Process Improvement (BPI) methodology from a research program by Sola Adesola and Tim Baines on Cranfield University, 2005.

MIPI is a generic model of BPI consists of seven procedural steps as guidance for action and decision. MIPI methodology can be use for improvement process and engineering process initiative. This methodology describe "what" to do and "how" to make it happen. The structure for this methodology contains a hierarchical structure includes: aim, actions, people involved, outcome/exit, checklists, hints and tips, and relevant tools and techniques

Model-Based and Integrated Process Improvement (MIPI) was developed from literature and discussion from practitioners. This methodology has been tested in two steps. First, a single case study was carried out which the researcher participated to nurse the newly formed BPI methodology through assessment. The second step by conducting case studies without direct involvement from researcher. Detail of BPI steps is shown in Table 1 below.
<table>
<thead>
<tr>
<th>Step</th>
<th>Step Description</th>
<th>Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Understand business needs</td>
<td>Develop vision and strategic objectives, Perform competitor analysis, Develop organizational model, Evaluate current practices, prioritize objectives, Scope change, Establish measurable targets, Develop process objectives and assess readiness, Obtain approval and initial project resource, Benchmark the process</td>
</tr>
<tr>
<td>2.</td>
<td>Understand the process</td>
<td>Identify the business process architecture, Scope and define the process, Capture and model AS IS process information, Model the process</td>
</tr>
<tr>
<td>3.</td>
<td>Model and analyze the process</td>
<td>Verify and validate the model, Measure the existing process performance, Analyze the business process</td>
</tr>
<tr>
<td>4.</td>
<td>Redesign process</td>
<td>Benchmark the process, Identify performance criteria for re-design process, Identify focus of re-design activity, Model and validate new TO BE process model, Identify IT requirements, Estimate performance of re-designed process</td>
</tr>
<tr>
<td>5.</td>
<td>Implement new process</td>
<td>Plan the implementation, Obtain implementation approval, Review change management plan, Communicate the change, Technological development, Make new process operational, Train staff, Roll-out changes</td>
</tr>
<tr>
<td>7.</td>
<td>Review new process</td>
<td>Develop strategic view of the business, Set process targets and performance, Develop a plan to meet targets, Implement</td>
</tr>
</tbody>
</table>

3. **RESULT**

Data collection gathers by conducting interview and company documents. Data collected are:
- company vision & mission, strategy and organization structure;
- performance indicator;
- process flow;
- production capacity & location;
- product specification & quality;
- technology;
- resources & infrastructure;
- others.
Understand Business Needs

From data collection and interview it was observed that company want to improve customer satisfaction and improving existing process performance. Process Improvement Team (PIT) consists of representative from each department also created to conduct business process improvement.

Understand the Processes

Deep understanding of business goals is very important in business process improvement program. Many efforts will be useless and program will not appropriately execute if improvement program not align with organization goals. This research continues by understanding existing processes after knowing company needs. Understanding processes is conducted by mapping existing process, method used was IDEF0 (Integrated Computer Aided Manufacturing Definition), one of modeling tools being used in business process improvement activity. IDEF0 format consist of diagram describing process or system. Using box connected by arrow line to show direction. Process, function or activity represent by boxes inside diagram while arrow line connected to box represent specific data such as object, information or data required or produced by a specific activity. Type of arrow line used in IDEF0:

(1) Input: class of arrow that express IDEF0 input. Input arrows are associated with the left side of an IDEF0 box. This arrow describe object or information which can use as activity.

(2) Output: the class of arrows that express IDEF0 output, i.e.: the data or object produced by a function. Output arrows are associated with the right side of an IDEF0 box.

(3) Control: the class of arrows that express IDEF0 Control, i.e.: condition required to produce correct output. Data or objects modeled as controls may be transformed by the function, creating output. Control arrows are associated with the top side of an IDEF0 box.

(4) Mechanism: the class of arrow that express IDEF0 mechanism, i.e.: the mean used to perform a function; includes the special case of Call Arrow. Mechanism arrows are associated with the bottom side of an IDEF0 box.

Problem Area Identification

From brainstorming result, PIT team will focus on customer complaint. PIT team using Pareto Chart to
identify the most frequent causes of customer complaint. From diagram created showed that the major problem was small and week DOC (days of chicks).

From Pareto Chart result, PIT team continue the research by develop a cause and effect diagram to identify root cause from small and weak DOC problem. Through discussion and brainstorming, PIT team develop probability from each nonconformance. Below is the cause and effect diagram from small and weak DOC (Figure 5). As the result from the diagram, PIT team can identify type of problems and each causes (Table 2.)
<table>
<thead>
<tr>
<th>Factor</th>
<th>Problems</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man</td>
<td>Not following procedure</td>
<td>Employee doing their job as their own experience</td>
</tr>
<tr>
<td>Method</td>
<td>Pre-Heat process was not conducted</td>
<td>Focusing to achieve production target</td>
</tr>
<tr>
<td></td>
<td>Over stay in Holding Room</td>
<td>Wrong placement</td>
</tr>
<tr>
<td>Material</td>
<td>Hen/Chicken not in god health</td>
<td>Lack of control of farm sanitation</td>
</tr>
<tr>
<td></td>
<td>Over time during travel</td>
<td>Traffic Jam</td>
</tr>
<tr>
<td></td>
<td>T/H inside truck was not meet standard</td>
<td>Limited truck with good standard T/H</td>
</tr>
<tr>
<td></td>
<td>Small grade eggs</td>
<td>Limited of good quantity eggs from supplier</td>
</tr>
<tr>
<td>Machine</td>
<td>T/H control not meet standard (too cold of too hot)</td>
<td>Inappropriate setting, calibration not conducted as per schedule</td>
</tr>
<tr>
<td></td>
<td>Machine shutdown</td>
<td>No electricity</td>
</tr>
</tbody>
</table>

Table 2. List of Problem Causes – Small and Week DOC

Analysis and Corrective Action Plan

During this step, FMEA or Failure Mode and Effect Analysis is as an improvement tool used to make prioritization of each failure mode from Small and Weak DOC. Severity, Occurrence and Detection criteria are created to identify the highest risk of failure modes and prepare the corrective action. Several failure modes with the highest risk selected as action plan. In this research, action plans selected is detailed into matrix called Process Improvement Matrix (PIM). PIM is a tool created to monitor the progress of process improvement activities. Each action plan are clearly described its progress using rating and Color Coding. Three Color Coding (Red/Yellow/Green) is use to describe its status against deadline target.

Detail of process improvement matrix from Small and Weak DOC problem can be found in below table:

Table 3. Process Improvement Matrix of Small and Weak DOC

4. CONCLUSIONS

From the business process improvement research using Model-Based and Integrated Process Improvement, criteria’s and target shall executed by company has been identified. Several quality improvement plans created to ensure company to meet with the business needs. “Small and Weak DOC” was identify as the highest customer complaint and by using cause and effect diagram several causes has been identified, i.e.: wrong setting; sick chicken; machine problem; temperature and humidity not meet with standard; over stay in holding room; pre-heat process was not conducted; long time delivery process; small grade eggs; not following procedure. As per Risk Priority Number from FMEA, it was observed that the “Wrong Setting” has the highest RPN. To easily monitor the progress of action plan taken, the Process Improvement Matrix is being used.

REFERENCES


