A Process Management Improvement practical application through the teamworking approach.

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ABSTRACT

Process management and process improvement are part of the Total Quality Management (TQM) philosophy which started back in the 1920’s and gained importance in the 1980’s together with teamworking for organization to identify technical problems in immediate work related areas and alleviate these issues by using quality management process improvement tools and techniques. This paper illustrates through a case study, a practical application of the process management improvement approach in a poultry production business unit by using a problem solving approach to improve performance and productivity. By the set up of a Process Improvement Team (PIT) and the application of the Deming PDCA (Plan-Do-Check-Action) cycle, broiler liveability which is a crucial parameter in the operational activities of poultry production was improved for the period of study where an excess of one full week production was achieved over existing six months complete broiler cycles. This challenging study was conducted for nearly two years as it was a technical project and also needed several broiler liveability cycles to compare the before and after improvement when the PDCA problem solving methodology was practically applied.

Keywords: Broiler liveability, Case study, Continuous Improvement, PDCA cycle, Problem-Solving Approach, Process Improvement Team, Teamworking.

Background of study

The poultry industry has been undergoing various challenges with broiler liveability being a fundamental parameter for productive performance of operational activities. Broiler liveability refers to the mortality of broilers (chicken reared up to 45 days) which is normally recorded daily on respective broiler farms. Broilers are chicken reared up to averagely 45 days before slaughtering and processed at the processing plant to be packed. The broiler liveability was not performing for the previous 10 years according to set industry standards and was a concern for the organization which at that time produced about eight metric tons of chicken annually. A Process Improvement Team (PIT) was set up by the operation manager with support of top management in the respective broiler department of the poultry strategic division unit. Training was provided by a quality practitioner from Singapore to the manager, supervisors and some other team members to understand the Deming PDCA problem solving cycle and to apply it in order to successfully resolve the problem of broiler mortality. The PIT constituting of nine team members was set up as follows with the manager as the facilitator, a leader, a reporter, a time keeper and other team members. Team members were team leaders who normally administered the daily operational activities of the broiler farms. As this was a very difficult and technical problem the PIT had to study several broiler cycles to fully understand the pattern of broiler liveability. There were normally about five broiler cycles every year and it has taken the team about two years to work on this challenging project.
The Continuous Improvement Approach in the Process Improvement Teamworking

Total Quality Management (TQM) concept is an old distinct discipline started in the manufacturing sector in the United States in the 1920’s (Berk, 1995). As described by Cohen and Brand (1993) companies that have adopted Total Quality Management (TQM) strategies have learnt to work better and gain competitive advantage allowing employees to make use of their knowledge and available experiences. Continuous quality improvement needs a new way of managing work where employees are not only ordered but ask to think and participate in the process of organizing work (Cohen and Brand, 1993). The initiation of the BIT in the broiler department for this case study was set up in line with the organization quality culture and continuous improvement initiative. A good road map for implementing and realizing Continuous Improvement is by assisting employees to work on selected continuous improvement projects by assigning teams (Berk, 1995). Teams are often seen as a solution for improving collaboration, performance and productivity in knowledge-based organizations (Donnellon, 2006). The concepts of involvement, empowerment and teamwork are crucial for the realization of Continuous Improvement or Process Improvement by allowing the organization to fully utilize its human resources capabilities to achieve significant teamworking synergies. Hence, the PIT as set up in the poultry division was a Continuous Improvement and teamworking initiative to foster better productive performance.

Process Management and Process Improvement

As described by Booth (2007), process management is normally used to enable a group of employees to analyze its work from the various stakeholders dimension by determining a way to monitor the performance of the process. Process improvement provides a structured environment for employees to work together in a team by applying Deming PDCA or Six-Sigma DMAIC cycles to improve work processes and eliminate problems from their jobs. The employees are also empowered to make fact-based decisions about how they can make the improvement happened. With the application of a structured problem solving approach in a team, the process improvement is normally achieved. The PIT in the broiler department was initiated by using both the process management and process improvement initiatives.

The relevance of Quality Control Circles.

Quality Circle (QC) previously known as quality control circle originated in 1960s under the tutelage of Dr. Kaoru Ishikawa and is a team approach to problem solving (Berk, 1995). An extensive review of literature shows that there is a reduction of empirical research on the effects of quality circles (Ferris and Wagner, 1985; Head et al; 1986; Ramsing and Blair, 1982; Wagne et al; 1986) as cited by Yukongdi, 2001. In fact, some research suggests that QC has a positive impact on a company productivity and quality (Berk, 2000; Goh, 2000; Mepza, 1988 and Terziovski et al, 1999). Melbourne Charter Australian Quality Circles Association (AQCA) (1998); Barad and Kayis (1994); Berk (1995); Goh (2000); MEPZA (1988) and Quality Systems (1999) have described QC as a means to improve teamwork. As described by Covey (1989), a “paradigm shift” is a shift in the thinking process and changing ways of doing things in a continuous improvement approach. There has been a “paradigm shift” from Quality Control Circles (QCC) to Quality Teams, Business Improvement Team, Corrective Action Team, Kaizen Team, Self Managed Team, Work Place Improvement Teams and many other nomenclatures. Thus, the QC teamworking approach is evolving, constantly changing and re-engineered to fit organizational needs and objectives. However, Quality Circle cannot be separated from teamwork as without teamwork there is no QC. “Individual working is less efficient than the collaboration of many
individuals’ Conti and Kleiner (1997). As described by Zetie (2002), the Deming Plan-Do-Check-Action (PDCA) cycle used in QC seen as a learning cycle leading to continuous improvement has a strong similarity to Kolb’s (1984) experiential learning cycle. Similarly, the PDCA has also a linkage to the Six-Sigma DMAIC cycle. Nevertheless, the Continuous Improvement Teamwork Approach (CTIO–Concern-Tasks-Interactions-Outcome) model which is being presently researched by the author is different as it involves team member interaction through the process of consultative, participative and interactive communication networking.

**From Quality Control Circles to Business Improvement Team.**

Quality Control Circles have made contributions in terms of tangible and intangible gains in many companies which have adopted this Total Quality Management (TQM) derivative. Quality Circles normally constitute of a secretariat, facilitator, leader and team members who work to improve any serious problem affecting the smooth running of operation in their immediate place of work. As described by Singapore Technologies Automobile (1996), Quality Control Circles (QCC) which was formed in 1985 changed nomenclature to Business Improvement Team (BIT) in June 1995 to steer their teams to be more focused on the business of the day. The BIT was part of their Total Quality Commitment (TQC) movement. The TQC steering committee was normally chaired by the CEO who sets directions, policies and approves all TQC plans. The BIT’s concept did provide a strong framework in implementing the problem solving PDCA cycle to improve the business. By applying the same principle, the PDCA or PDSA cycle problem solving methodology was adopted to alleviate the problem of poor liveability using the BIT concepts in the underlying case study.

**The Conceptual PDCA cycle approach to Process Improvement.**

**Purpose of the PDCA cycle.**

PDCA cycle helps team members to solve problems as it provides the structure for work improvements so that a team can use the various tools logically, identify and analyse problems, develop workable solutions, solve problems and ensure that they will not happen again (STA, 1996). The PDCA cycle is shown in Figure 1.

![PDCA Cycle Diagram](image)

**Figure 1: The PDCA cycle problem-solving approach (Quality system, 1996).**
The eight steps in the PDCA cycle.

Table 1: The 4 stages in Deming PDCA problem solving methodology can be further broken down into eight steps (STA, 1996).

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activities</th>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAN</td>
<td>Step 1: Select Theme</td>
<td>• Topic is selected through consensus</td>
</tr>
<tr>
<td></td>
<td>Step 2: Plan Schedule</td>
<td>• Reasons for choosing the topic must be explained</td>
</tr>
<tr>
<td></td>
<td>Step 3: Grasp Present Situation</td>
<td>• Plan activities and time schedule</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Allocate manpower resources</td>
</tr>
<tr>
<td></td>
<td>Step 4: Set Target</td>
<td>• Collect data to determine present situation</td>
</tr>
<tr>
<td></td>
<td>Step 5: Analyse and Determine Problem and Plan Corrective Action</td>
<td>• Where possible, data should be collected to support how &quot;bad&quot; the situation is.</td>
</tr>
<tr>
<td>DO</td>
<td>Step 6: Implement Plan</td>
<td>• Set target for improvement</td>
</tr>
<tr>
<td>CHECK</td>
<td>Step 7: Evaluate Results</td>
<td>• Suggest possible causes</td>
</tr>
<tr>
<td>ACTION</td>
<td>STEP 8: Standardise Actions Taken / Review</td>
<td>• Investigate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Isolate actual causes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Give as many solutions as possible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Try out best solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Record findings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Observe any side effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Collect data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Evaluate effectiveness of solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If target is not met, return to Step 5 and start again</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If objectives are met. Solution should be standardised and put in official manuals.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Monitor the process periodically to ensure that the desired results are maintained.</td>
</tr>
</tbody>
</table>
The PLAN-DO-CHECK-ACTION (PDCA) cycle.

The PDCA stands for PLAN-DO-CHECK-ACTION. As described by Singapore Technologies Automobile (Quality Systems,1996 ; STA,1996), the PDCA cycle is a very important and useful concept in BIT. The PDCA is also known as ‘Deming cycle’ or ‘Control cycle’. It allows us to deal with a problem systematically where the data collected will support the decisions and solve the problem. PDCA assists team not to jump to conclusions but to look for the root causes of the problem. PDCA can also be used to manage and check on the progress of a project. By following the steps in the PDCA cycle, the team had a better chance of completing the project on time and on target. The 8 steps in the PDCA cycle which are commonly used by BITs are shown in table 1. Each step need to be followed at a time. The results achieved are eventually checked at Step 7 (Evaluate Results). When the results do not meet the team expected target, the team need to go back to step 5 in Plan stage to find out why the target has not been met.

The Problem-Solving Process

As mentioned by Berk (1995), strong problem-solving skills are essential to successful TQM implementation and without these skills one is doomed to solving the same problems over and over again. Problem solving might sound that it is a good task in high-technology situations. But the basic problem-solving approach can be used to alleviate all problems. The technology may differ but the basic approach to solving problems for continuous improvement stays the same as it has been used long time ago. The problem-solving process when uses, improve the quality and business processes through a systematic approach to promote staff involvement, enhance motivation, improve teamwork and communication (Quality Systems, 1996 and STA, 1996).

The versatility role of teamworking in the PDCA cycle.

The quality circles and teamwork approach has shown positive impact on the quality of work life, productivity and absenteeism in government (Cohen and Brand, 1993), other industries such as health care (Yaw, 1993), electronics (Gerry, 1995) and banking (Lampe and Sutton, 1992) as cited by Goh (2000). There is a body of research and knowledge underpinning teamwork. As mentioned by West, Tjosvold, and Smith (2005), human beings have been working in teams for over 200,000 years in discovering the structure of the human genome, building great palaces, exploring the space and other planets etc… A team can be defined to be a group of people working together to achieve a goal (Conti and Kleiner, 1997) or as a collaborative activity of individuals (Shapiro, 1997). Teams became more popular in the 1980’s (Snee, Kelleher and Reynard, 1997). Teamworking has been improving organizational health (Woodcock, 1989) and driven quality forward (Peterson, 1991) as cited by Ingram et al (1997). The quest to reduce the gaps between poor quality to good quality and low profitability to that of high profitability can be facilitated by the implementation of teamwork. Creating teams with an edge is the complete skill set to build powerful teamwork (Donnellon, 2004).

The benefits of teamwork building capabilities for organization was also studied by Transfield, Parry, Wilson, Stuart and Foster (1998) where they illustrated three team archetypes and characteristics namely Lean teamworking (waste elimination and continuous improvement), Self-directed teamworking (commitment and
involvement generate creativity and innovation) and Project teamworking (integration and coordination). When teams work well, the results can be extremely powerful with synergy created with experiences leading to a more effective delegation of tasks, a more stimulating and motivating environment for team members” (Donnellon, 2006). As reported by Turvey and Neal (2001), a high performance work system is a recent new approach discovered in relation to labour management and is being said to be appropriate in the current business environment. It involves the use of systems of work practices for business success by putting greater emphasis on worker participation, teamworking and flexibility in work design together with decentralised managerial tasks and responsibilities. As described by Donnellon (1996), a high-performing team is a group of people with complementary skills who interact to achieve a common objective and an approach for which they hold themselves collectively responsible.

**Research Objective**

To improve broiler liveability using a Process Improvement Teamworking Approach through the application of the problem solving PDCA cycle.

**PDCA Methodology**

The eight steps of Deming PDCA cycle as described by Quality Systems (1996) is used to illustrate this case study and perform the project work of improving broiler liveability.

**STEP 1: THEME SELECTION**

After obtaining approval from the organization, the team started the project under the responsibility of the operation manager who was the manager and facilitator for the team. Team members were under the manager’s direct responsibility reporting on a daily basis. After training successfully done by an external consultant in Quality Control Circles form Singapore, the team started to select the theme as the project understudy. As the theme was generally quite broad it was made more focus through a statement of the problem to be addressed as the project work. The brainstorming, Theme Selection Matrix, 5W 1H questioning technique and Paired Comparison Analysis (PCA) chart as common tools and techniques were used to select the theme which has the greatest concern to be addressed. The PCA chart was used as it gives a systematic selection of the theme by team consensus through a voting exercise with the common likert scales of 1 (lowest preferred) to 5 (highest preferred). The criteria used for the theme selection were cost benefits, closely related to companies strategies, policies and procedures, serious obstacle, will improve employees morale, within capacity of team, real need and challenging. The theme for improving broiler liveability scored the highest mark and was the theme selected by the team through common team consensus.

**STEP 2: PLAN SCHEDULE (SCHEDULE OF ACTIVITIES).**

A time table was designed by the team to plan and monitor its progress. Members were assigned to take on certain tasks such as two team members were involved specifically in the data collection process for fields works, other team members had to prepare for some technical experiments to be conducted in order to confirm through justification the exact cause of poor liveability and many others tasks. The manager helped to make sure that respective tasks were completed on time. The common tool used for the schedule planning of the project was the Gantt chart or Schedule of activities. The team planned that due to time constraint, the project should be followed for nearly two years to have a good standardized procedure together with integrity and
accuracy of data. The milestone chart illustrated for 22 months the schedule to be done to fully complete the project with the following activities, theme selection, present situation, data collection, target setting, cause analysis, countermeasures analysis, management approval, implementation, check results, standardization of procedures and project review.

STEP 3: GRASPING THE PRESENT SITUATION.

After the theme was selected, the team needed to understand the present situation to identify the present status of the problem and to confirm the real occurring of the undesired situation. To understand the present situation data collection before improvement was done and the team performed a process characterization to properly understand the process. Some of the tools used were the process flow chart to properly understand the operational activities, check sheets to collect data, graphs and Pareto chart to understand fully the present situation causing the problem of poor liveability on broiler farms. The before improvement Pareto chart was drawn by the facilitator who was the manager considering the team consensus on the causes to be addressed. The before Pareto chart showed the main causes of poor liveability and which needed to be addressed by team at the beginning of the project work. The process flow chart illustrated the work process characterization of each step involved from placing day-old-chicks on broiler farms to be grown for 45 days to broilers and then sent to processing plant for slaughtering. The various farms were in different locations due to biosecurity measures and hygiene. There was a total of eight farms involved in this case study belonging to only one organization.

All team members had to meet in a specific farm or sometimes in main office as decided by manager relating to focus of the organizational concern relating to performance which needed to be addressed by team. In grasping the current situation the accuracy and integrity of data was something which was of real importance to effectively understand the problem of poor liveability of broilers. To effectively do that, the team had used the 5W-1H questioning skills by asking themselves firstly what data to collect relating to poor liveability, when will it be good to collect, which farms the data collection will be done, the designated team members to be involved in the data collection process, how the information needed to be collected, till when the data would be continually collected and lastly how much data the team had to collect to have a reliable source of data for analysis in determining the root cause of the problems. The data summary from check sheets which was for the data collection before and after improvements are illustrated in Tables 2 and 3.

STEP 4: TARGET SETTING

All the team members together in the team, objectively set a target for the project of improving broiler liveability by 2.5%. The team believed at that time that the target set was reasonable, practical, achievable, believable, applicable and easy to understand considering the nature of the problems and possible of success within challenging limit. The team also did not set a too high target so as not to discourage and de-motivate the team. The target was set to 2.5% after the controllable causes of poor liveability were discovered by the team. At this stage the team was still in the learning phase and only the causes that had been analyzed did reveal whether the target was realistic or not.
STEP 5: DATA ANALYSIS AND CORRECTIVE ACTION PLAN

This was the most time consuming step in the process, as it was the most important one in solving the problem of poor liveability. The team at this stage managed to find out the causes of the problems which were mainly the operational factors which related to machinery break down and effective usage of labour skills, hygiene factors which related to cleanliness and biosecurity measures on farms, rearing of day-old-chicks to broilers, ways birds were fed and other environmental factors which related to disease etc… The root cause of each cause was identified using a cause and effect diagram (or fish bone diagram) which the team had drawn on a big white board and used flip charts to diagnose each root cause. The major and minor root causes of high broiler mortality rate were then stratified. Working on the cause and effect diagram was done in several sessions as the team wanted to do it right first time in detecting the right root cause of poor performance. The manager as the quality champion at this stage was very useful as a coach in driving team to the right direction to focus on main issues of the problem understudy. To be able to solve the problem, the main issues were broken down into more manageable parts to better understand the root causes. As data collection was very important and to collect the right data, the team had spent a lot more time and effort to explore the various root causes and effectively detected the right ones.

The cause and effect had systematically shown the relationship of poor liveability with other possible factors as mentioned. In the problem solving activity, the characteristic which is normally the effect illustrated the concern being researched. It was from the cause and effect diagram that the team properly identified the problems areas and had established corrective actions. Other team members were also crossed trained in the team meetings sessions which normally took place once weekly for one to two hours. The brainstorming, 5W-1H questioning skills techniques and voting exercise were used through the five sessions in determining the cause and effect relationship to capture the right root cause. The synergy of team had led to a team consensus on each selected root cause. As everyone in the team was experienced technically in the respective poultry field ranging from 5 to 15 years, the best possible root causes were identified through the consultation and participation of team. The intervention of the manager who was the facilitator was necessitated on several occasions to prevent group think because those team members who were more experienced were trying to dominate with their views. Scatter diagrams were used with the help of the facilitator to better understand the relationship between the possible root causes of poor liveability to the effect of high mortality rate of broilers. All the root causes that were selected through the team consensus had a positive correlation with the effect which illustrated that the precise root causes were diagnosed by the team. The selection of the right tool to be used on the cause and effect diagram was also very important. The manager assisted in selecting the right tool to be used.

STEP 6: IMPLEMENTATION

After the right root causes were identified, possible solutions were proposed by the team. Some of the tools and techniques such as brainstorming, 5W-1H, stratification, checksheets, and solution matrix representing the countermeasures were used again. The solution matrix was used to detect the best alternative solution. A PCA chart was also used with a severity index for team to brainstorm on the right solutions to address the right root causes. The selection criteria for the severity index used for choosing the best solutions were cost, time, effectiveness, relevancy, degree of urgency and practicality. The best solution selected by team consensus were then tested on trial first on respective farms as decided by the team. Side effects of the root causes were observed. After trial done and team satisfied with outcome, the selected alternative solutions from the countermeasure table were ranked. A ranking order of merit for each solution proposed were
given by the team. The main solutions were then sent for senior management approval which was
granted after one month. An external consultant was involved at this stage by the organization to
advise on the possible selected and recommended technical solutions proposed by the team. The
senior management team did take due care for approving the proposed solutions so as not to
change or disrupt the normal working process but to contribute as a process improvement
activity. A few amendments of recommended solutions had to be made by the team before
complete approval was obtained. When approval obtained in writing from senior management all
the recommended solutions were then implemented on all the broiler farms.

STEP 7: RESULTS EVALUATION

This is the check stage in the PDCA cycle. After step 6, the results of the team recommended
solutions of poor liveability implemented on all the broiler farms were evaluated. Similar
checksheets as used in the before improvement stage were used to collect data in the after
improvement stage. Integrity and accuracy of data collected was also maintained by the
facilitator. The two Pareto Analysis Tables for before and after improvement as shown in Tables
2 and 3 with the items illustrating the causes of poor liveability were used to compare the results
achieved. A 28% improvement was obtained in the after improvement Pareto Analysis Table as
illustrated in Tables 2 and 3. The forecasted target as set in the starting stage of the project was
compared and it was exceeded by 19 % for a particular period which meant that the solutions had
solved the root causes as previously identified. Some hidden factors could not be diagnosed due
to external, disease and environmental issues which were beyond the team control. The constant
evaluation of team by the manager/facilitator with the use of a check list, role clarification
worksheet, facilitator constantly informing team through memos and team time-out (how team
performing?) were leading team tools which have made the team to commit and perform better.
The before and after Pareto Analysis Tables in Tables 2 and 3 and the Project Monitoring Charts
in Figure 2 are illustrated below.

Table 2 : Before Improvement Pareto Analysis Table

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>CUM/FREQUENCY</th>
<th>%</th>
<th>CUM %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>77,888</td>
<td>36.8</td>
<td>36.8</td>
</tr>
<tr>
<td>2</td>
<td>59,263</td>
<td>28.0</td>
<td>64.8</td>
</tr>
<tr>
<td>3</td>
<td>31,748</td>
<td>15.0</td>
<td>79.8</td>
</tr>
<tr>
<td>4</td>
<td>20,107</td>
<td>9.5</td>
<td>89.3</td>
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<td>5</td>
<td>14,180</td>
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<tr>
<td>6</td>
<td>8,468</td>
<td>4.0</td>
<td>100</td>
</tr>
<tr>
<td>TOTAL</td>
<td>211,654</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

ITEMS: Illustrates the causes of poor liveability with item 1 as the major cause and the item 6 as
the minor cause from a ranking order of 6 causes as shown in the cumulative frequency column.
Table 3: After Improvement Pareto Analysis Table

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>CUM/FREQUENCY</th>
<th>%</th>
<th>CUM %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>44,080</td>
<td>29.0</td>
<td>29.0</td>
</tr>
<tr>
<td>2</td>
<td>31,920</td>
<td>21.0</td>
<td>50.0</td>
</tr>
<tr>
<td>3</td>
<td>27,360</td>
<td>18.0</td>
<td>68.0</td>
</tr>
<tr>
<td>4</td>
<td>24,320</td>
<td>16.0</td>
<td>84.0</td>
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<tr>
<td>5</td>
<td>15,200</td>
<td>10.0</td>
<td>94.0</td>
</tr>
<tr>
<td>6</td>
<td>9,120</td>
<td>6.0</td>
<td>100</td>
</tr>
<tr>
<td>TOTAL</td>
<td>152,000</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

ITEMS: Illustrates the causes of poor liveability with item 1 as the major cause and the item 6 as the minor cause from a ranking order of 6 causes as shown in the cumulative frequency column.

Effect Value (Y-axis)

Figure 2: Project Monitoring Chart with application of PDCA cycle.

Time (X-axis/ for 2 Years)

Figure 2: Showing the project monitoring chart for improvement in broiler liveability

STEP 8: STANDARDISATION OF PROCEDURES

When the desired target was achieved all the recommended actions were formally standardized by the team. The necessary training and operational manuals were amended by the manager/facilitator. The manager had to conduct training on new procedures to all staff in the respective department of the poultry strategic business unit. Fellow team members were acting as
coach to other staff for conduct of periodical reviews every three months to ensure that the new procedures were correctly followed and the root causes identified for poor liveability did not occur again. A monitoring chart with upper and lower control limit were established by team. It was found that from the Project Monitoring Chart as illustrated in Figure 2, that in period June to July in the respective year there was a reduction in broiler mortality starting high from about 10.7% (Period June/July) to 7.2 % (Period October/November). The reduction continued for another eight months before starting to stabilize in range of about 6 % as shown in Figure 2.

**IMPLICATIONS**

The team was faced with many difficulties as all the team members were not from the same place of work. Thus, the manager/facilitator had to organize for transport for each meeting. Three team members came from distant sites and there was always a delay in starting the meeting. There was also a lack of involvement and feedback from customers and suppliers to properly understand the urgency of situations. For instance, in designing and conducting an experiment suppliers had to supply various special equipments which were delayed to design small experiment lot of about 50 day-old-chicks to be grown up to 45 days as broilers. Contractor farms as customers purchasing day-old-chicks from the company were also used over the two years period for conducting the data collection and analysis. In some cases data was lately received in dispatch from some specific farms which were not cooperative on some instances. The solutions proposed were not implemented on the contractor farms to keep them as control factors for comparison with implemented solutions on experimented broiler farms. Thus, poor liveability was still recorded on the contractor farms after two years as compared to better broiler liveability which was tremendously improved on the farms practically involved in the project work.

The project was also contrasted by external, diseases and environmental factors contributing to some extent to poor broiler liveability. The manager as the facilitator was present in all meetings and had to be involved for two years in this crucial project as it could not be left under the responsibility of staff and team leaders. The manager was the driving force behind the success of the project as it could not be left solely in the hand of team members as there was formal reporting needed to be within management control. This can be justified by this illustration. At some stage of the team working exercise on this challenging project, the facilitator had to take into control the recording of team minutes of meetings and actions for next team meeting to be undertaken. Copy of team minutes of meetings were also given to senior management. When this was done the team members were more serious in doing the project. This was a fruitful exercise as it is at these particular managerial intervention that performance improvement was noted.

The basic model of a hypothetical team was done by Nurmi (1996) where the research was focused on four team leadership styles namely the Dictatorial (one person imposing his views in the group with outcome 20-50%), Compromising (consensus, arbitration or holding the group together is more important than the group’s performance with outcome 33.3%), Integrative teamwork (resources of the team are gathered together into an integrated outcome of the team with outcome 100%) and Synergistic teamwork (innovative teamwork with resources exceeding the input with outcome 100%). In this case study the manager as the facilitator has constantly been using the integrative and synergistic team leadership styles to make the team perform better to achieve productive performance. If these two leadership styles were not used, it would have been difficult to make everyone work as a team. It is by working on this challenging team project that the author as the manager /facilitator have discovered the Continuous Improvement Teamworking concept for organization to achieve productive performance which is presently being researched.
TANGIBLE AND INTANGIBLE GAINS OF THE PROJECT

Productivity improvement in monetary gains was obtained with an extra week production of broilers over a six months broiler cycles and there had been ongoingly better management practices with a close monitoring of countermeasures. Standardize procedures were established which can be followed by any new comer in the operational activity of broiler farms. This is also explained in the induction programme to new recruited employees. There were also intangible gains with team having a higher morale, stronger team spirit, a new paradigm in ways of doing things and communicating, positive reinforcement between team members, more creativity and the entire team felt a sense of pride and belongings. This is illustrated in a radar chart in Figure 3 where the manager had used a survey questionnaire to get the views and feedback of each team member before and after the accomplishment of the PIT project work on broiler liveability. The whole team was rewarded by top management for a deserved one week holiday to fly on an exotic islands. The team was also recognized by obtaining a national Quality Control Circle Award as the best team project work.

OBSERVATION AND CONCLUSION

This has been a very challenging project as it involves many technicalities and complex issues. If inexperienced staff were taken to work in the team it would not have been so successful. The involvement of the manager as the facilitator had played a tremendous role in the success of this crucial and challenging project. The presence of the manager in all team meeting does enhance
the productive part of the meetings as there is no distraction and team members had to perform since they were being constantly observed by a management representative. Once the commitment of the team was obtained it became as a free wheeling activity to be continually improving the process in line with the concept of continuous improvement. Thus, the concept of Continuous Improvement through both process improvement and teamworking had definitely played a great part for the success of this project work. Without teamworking all the co-located farms would not have obtained productive performance in the same period of time. This had led the author to see the emergence of the Continuous Improvement Teamworking Approach which is an ongoing study.

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