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QUALITY IMPROVEMENT INITIATIVES FOR SUPPORT FUNCTIONS IN AN INDUSTRY: TWO CASES

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Abstract: *The concept of quality improvement in industry has originated from the involvement of inspector which has become the most important part of manufacturing process or development activity. Over years, this initiative is migrated to various support functions of the industry. In this paper, emphasis has been given particularly in the areas related to support functions where improvement projects can be effectively done and hence organization wide impact is assessed. Two case studies are presented here in this context. The first study shows how smaller change in content structure and delivery method can drastically improve the training feedback and the second one demonstrates minimizing lead time to recruitment with a cost-effective process modification.*

Keywords: *Quality Improvement, Statistical Process Control (SPC), Six Sigma, Business Excellence Model (BEM), Customer satisfaction*

1. INTRODUCTION OF QUALITY

In early days of manufacturing operations, an operator's work was used to be inspected followed by a decision to be made whether to accept or reject it. As businesses became larger, so too did this role and full time inspection jobs were created. Accompanying the introduction of inspection functions, other problems arose:

- More technical problems occurred, requiring specialised skills, often not possessed by production workers;
- The inspectors lacked training;
- Inspectors were instructed to accept defective goods as well to increase output; and
- Skilled workers were promoted into other roles, leaving less skilled workers to perform the operational jobs, such as manufacturing

These obstacles led to the birth of the separate inspection department with a "chief inspector", reporting to the person in charge of manufacturing. With the creation of this new department, new services and issues were evolved, e.g, standards, training, recording of data and the accuracy of measuring equipment. It became clear that the responsibilities of the "chief inspector" were more than just product acceptance, and a need to address defect prevention emerged. Hence the quality control department was evolved with a "quality control manager" having responsibility for the inspection services and quality control engineering [1]. In 1920, statistical theory began to be applied effectively to quality control, and, in 1924, Shewhart made the first sketch of a modern control chart. His work was later developed by Deming and the early work of Shewhart, Deming, Dodge and Romig constitutes much of what today comprises the theory of statistical process control (SPC) [2,3]. However, there was little use of these techniques in manufacturing companies until the late 1940's. At that time, Japan's industrial system was virtually destroyed, and it had a reputation for cheap imitation products and an illiterate workforce. The Japanese recognised these problems and set about solving them with the help of some notable quality gurus – Juran, Deming and Feigenbaum [3].

In the early 1950's, quality management practices developed rapidly in Japanese plants, and become a major theme in Japanese management philosophy, such that, by 1960, quality control and management had become a national preoccupation. By the late 1960's/early 1970's Japan's imports into the USA and Europe increased significantly, due to its cheaper, higher quality products, compared to the Western counterparts. In 1969 the first international conference on quality control, sponsored by Japan, America and Europe, was held in Tokyo. In a paper given by Feigenbaum, the term "total quality" was used for the first time, and referred to wider issues such as planning, organisation and management responsibility. Ishikawa gave a paper explaining how "total quality control" in Japan was different, it meaning "companywide quality control", and describing how all employees, from top management to the workers, must study and participate in quality control. Company wide quality management was common in Japanese companies by the late 1970's.

The quality revolution in the West was slow to follow, and did not begin until the early 1980's, when companies introduced their own quality programmes and initiatives to counter the Japanese success. Total quality management (TQM) became the centre of these drives in most cases. In a Department of Trade & Industry publication in 1982 it was stated that Britain's world trade share was declining and this was having a

dramatic effect on the standard of living in the country. There was intense global competition and any country's economic performance and reputation for quality was made up of the reputations and performances of its individual companies and products/services [3]. The British Standard (BS) 5750 for quality systems had been published in 1979, and in 1983 the National Quality Campaign was launched, using BS5750 as its main theme. The aim was to bring to the attention of industry the importance of quality for competitiveness and survival in the world market place. Since then the International Organisation for Standardisation (ISO) 9000 has become the internationally recognised standard for quality management systems. It comprises a number of standards that specify the requirements for the documentation, implementation and maintenance of a quality system. TQM is now part of a much wider concept that addresses overall organisational performance and recognises the importance of processes. There is also extensive research evidence that demonstrates the benefits from the approach. As we move into the 21st century, TQM has developed in many countries into holistic frameworks, aimed at helping organisations achieve excellent performance, particularly in customer and business results [4]. In Europe, a widely adopted framework is the so-called "Business Excellence" or "Excellence" Model, promoted by the European Foundation for Quality Management (EFQM), and in the UK by the British Quality Foundation (BQF)."

After TQM, Six Sigma is the newest approach. Six Sigma [5] was originally developed as a set of practices designed to improve manufacturing processes [6,7] and eliminate defects, but its application was subsequently extended to other types of business processes as well. In Six Sigma, a defect is defined as anything that could lead to customer dissatisfaction. The term "Six Sigma" [8] is derived from a field of statistics known as process capability studies. Originally, it referred to the ability of manufacturing processes to produce a very high proportion of output within specification. Processes that operate with "six sigma quality" over the short term are assumed to produce long-term defect levels below 3.4 defects per million opportunities (DPMO). The particulars of the methodology were first formulated by Bill Smith at Motorola in 1986. Six Sigma is a registered service mark and trademark of Motorola, Inc. Motorola has reported over US$17 billion in savings from Six Sigma as of 2006 [9]. Other early adopters of Six Sigma who achieved well-publicized success include Honeywell (previously known as AlliedSignal) and General Electric, where the method was introduced by Jack Welch [10,11,12]. By the late 1990s, about two-thirds of the Fortune 500 organizations had begun Six Sigma initiatives with the aim of reducing costs and improving quality. In recent years, Six Sigma has sometimes been combined with lean manufacturing to yield a methodology named Lean Six Sigma. Six Sigma was heavily inspired by six preceding decades of quality improvement methodologies such as quality control, TQM, and Zero Defects [3]. Like its predecessors, Six Sigma asserts that *(a)* continuous efforts to achieve stable and predictable process results (i.e. reduce process variation) are of vital importance to business success; *(b)* manufacturing and business processes have characteristics that can be measured, analyzed, improved and controlled; and *(c)* achieving sustained quality improvement requires commitment from the entire organization, particularly from top-level management [13].

In the following section, two real-life case studies carried out in an industry are discussed where quality improvement initiatives are taken particularly in the support functions to improve the overall customer satisfaction.

2. QUALITY IMPROVEMENT INITIATIVES

2.1 Case Study-1: Improvement in Training Engagement

Problem Statement: An organization, engaged in providing training services in India, was facing a problem of low participant's engagement in their training feedback. This particular organization is known for providing quality trainings in the following areas;

- Soft skill training
- Process and product training
- Training related to quality
- Training for professional certification

These trainings are for different domain and are generally conducted by professional form the same domain. For this training service providing company, participant's feed back is the major success criteria for business success, hence for the company management it was matter of concern. The objective of the project was, therefore, to look into the root causes of the problem and resolve the issues.

Analysis: In order to address this particular issue, an improvement team started working on the feedback analysis. While they started the analysis, it was found out that, the training feedback analysis is multi laired nested feedback analysis and hence need separate analysis for different types of training , different topics and different trainers. Hence, the problem can be represented as in *Figure 1.*

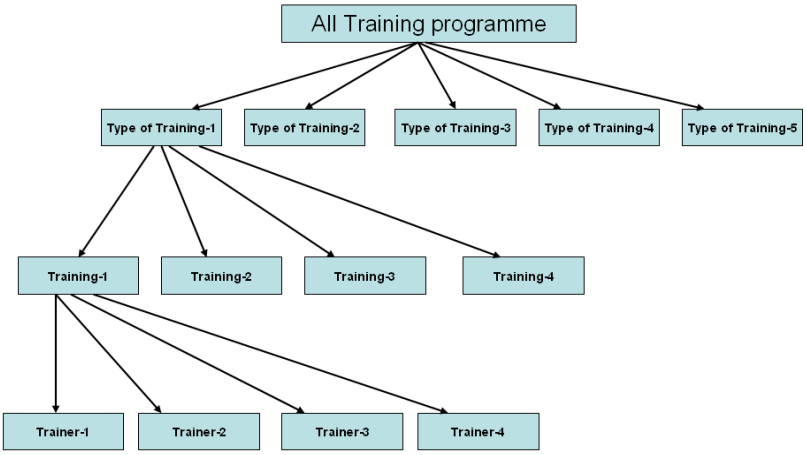

Figure 1. Nested Segmentation Analysis of Training Feedback

While doing the segmentation analysis (nested) it was observed the training feedbacks were really low for topics related to quality, across the location of training and for all the trainers. The average training rating was 3.5 out of 5. The comments were more interesting:

- The topic was difficult to understand
- Session could have be more engaging
- It was difficult to understand the theories
- Could have been done in more lucid way
- It was monotonous and not interesting
- Participants were uncomfortable due to lack of interaction

Hence, it was clear that, due to low engagement rating in the training topics related to quality, feedback data was skewed. From the qualitative feedback, it was obvious that as topics were very specific, participants were not feeling interesting due to monotony of the lecture.

Proposed Solution for implementation: So, after brainstorming, course designers came into conclusion that, in order to get good rating and feedback, courses needed to be redesigned and delivery method needed to be changed.

Some changes are done in the course design and trainers were informed about the proposed changed in the delivery method. Some "Train the Trainers" sessions were carried out for the trainers to make them conversant with the changed delivery method. The list of changes suggested and potential benefit to be expected are tabulated in *Table 1*.

Measures of improvement: After implementing the proposed changes based on the participant's (customer) feedback, the participants' feedbacks are again analyzed for all the quality related courses conducted across different locations in India. Quantitatively, the average training rating drastically improved to 4.8 from 3.5 (out of 5). The qualitative feedbacks are also improved which shows that most of the participants are highly satisfied after attending training. Some of the comments observed are found to be quite encouraging in this context as follows.

Table 1. Proposed Changes and Expected Benefit

Present process	Changes suggested	Benefit
In most of the quality training excessive theory was introduced.	Along with the theory some "Test Yourself" questions to be introduced.	Engagement of the trainees will be increased.
Assessments sections were kept only at the end of each chapter.	Small assessments need to be included after each of every chapter.	Assessing the learning will be easier.
Lectures are monotonous in nature.	To break the monotony of the training process, some fun elements may be introduced.	Trainees will feel more attraction towards the training and programme will be less monotonous.
Difficult languages are used during training.	Training should be given in lucid manner and all jargons need to be removed.	Even new comer in the field will be able to understand the content.

- The instructor did his very best to make the course exciting.
- I liked the part which dealt with the most common mistakes found in completed projects.
- The effort put in by the trainer to make the session was as interesting as possible.
- The interactivity that the trainer used in this session to clear our doubts and make us understand the topic.
- The effort by the trainer to convert something boring into interesting...like the use of music, etc.
- The wonderful and interesting way in which the topic was initiated and covered. The background music was very nice also. It was a successful attempt to make an otherwise boring topic really interesting. The games and the "assessment" were really interesting and nice.
- The trainer was very persuasive in imparting his bit to us. His preparation was apparent and very impressive.
- a very candid and interactive session
- The content of the training was very informative.
- The course content was very good. Even though it was quite technical and something that probably all of us heard for the first time, yet he made it simple for us.
- It was a lively session which was enjoyable, as well as useful for the information content of the session.
- Presentation was done in a very interesting manner. The Business Excellence Model (BEM) is a very exhaustive and difficult subject.

2.2 Case Study-2: Reduction of Lead Time in Recruitment

Problem Statement: There was an increasing trend in Lead Time to Recruit (LTR). It was found that during the investigation period the average LTR was 77 days. It is aimed to reduce the LTR to 54 days with 30% improvement in the activities related with recruitment process. The objective of this project is, therefore, identified as

- to study the micro level activities in the current process;
- to identify the causes responsible for high LTR;
- to eliminate/have proper control over the controllable causes;
- to reduce the time required for process operation; and
- to improve internal customer satisfaction.

Process approach: It was decided to find the solution for the problem in the following ways:

- Preparation of the Process flow diagram for the recruitment process (*ref. Figure 2*)
- Identification of probable causes of High recruitment lead time (*ref. Figure 3*)
- Drawing the activity diagram in the macro level and find out the areas of pain (*ref. Figure 4 & Figure 6*)
- To find out the proposed solution to address the issues and the benefits of solution
- To find out the top level issues and action plans to address the same
- Pilot implementation and calculation of improvement percentage

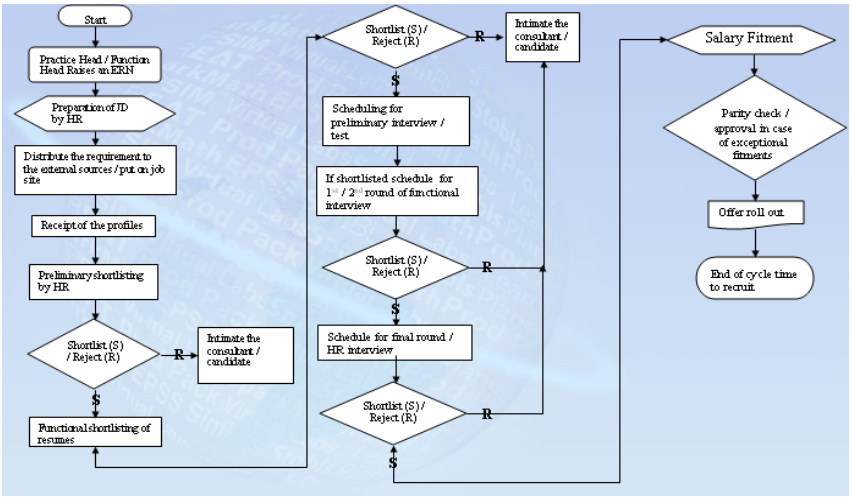

Figure 2. Process Flow Diagram for LTR

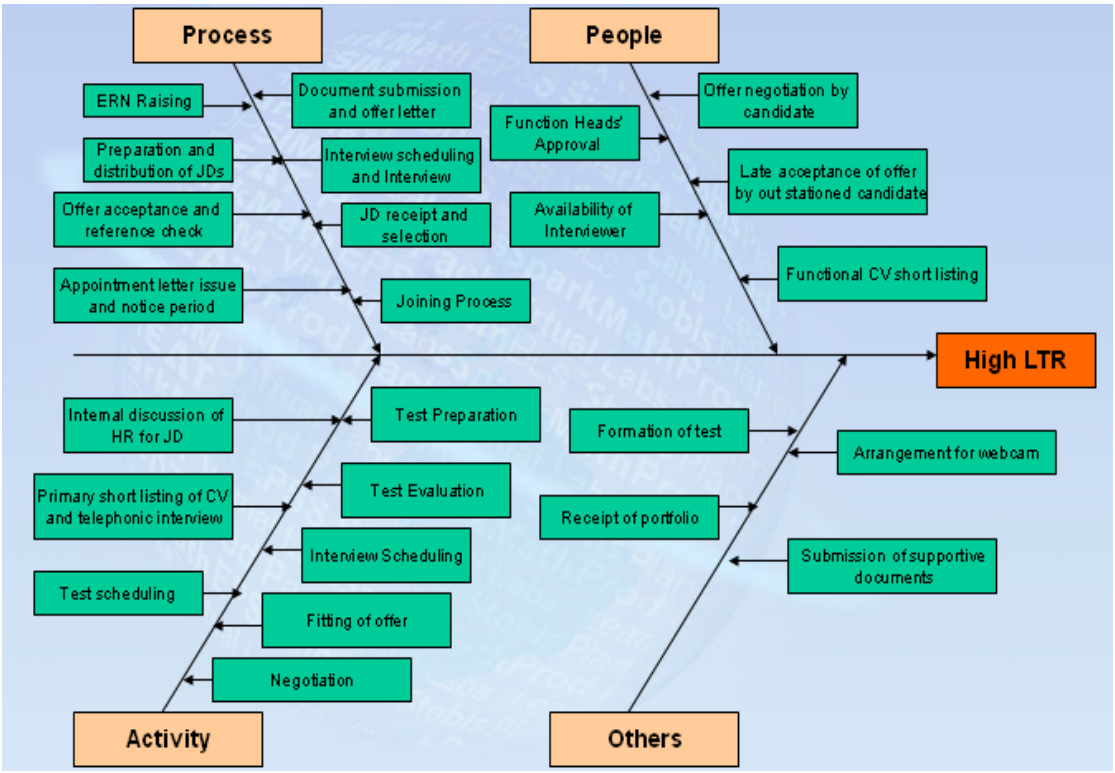

Figure 3. Cause and Effect diagram for High LTR

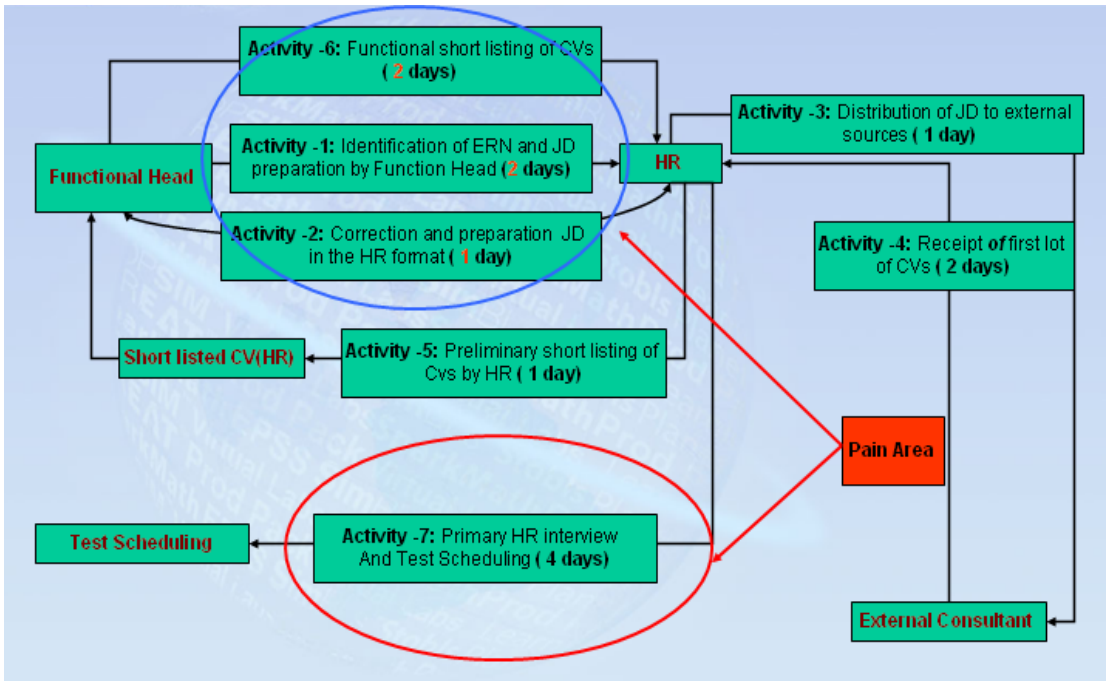

Figure 4. Activity Flow Diagram for the existing process: Sourcing of Resume & Scheduling of Interviews"

The list of changes suggested and potential benefit to be expected are tabulated in *Table 2*.

Table 2. Proposed Changes and Expected Benefit

Present Process	Changes suggested	Benefit
In most of the cases the job description (JD) mentioned in the Employee Requisition Number (ERN) is incomplete and HR has to go back to the functional heads to complete the JD.	To update the ERN Database in such a way that unless all mandatory fields are filled in the ERN form, system wont accept the requisition.	Estimated duration will be 1 day instead of earlier 3 days. Hence there will be a gain of 2 days.
Presently distribution of JD is not happening in a systematic way.	Once the ERN generation process becomes smooth there will be proper 5S maintaining for different category of ERN and external consultant names.	Estimated duration will be 0.5 day instead of earlier 1day. Hence there will be a gain of 0.5 day.
Functional CV short listing is taking too much time and there is no SLA for that.	After discussion with the functional heads an SLA has been fixed. Here, the team will give their feedback for 10 CVs per day.	Estimated duration will be 1day instead of earlier 2 days. Hence there will be a gain of 1 day for 10 CVs.
Presently scheduling of test was taking 3 days.	Now this test scheduling has been excluded from this part of process.	Gain of 3 days in this activity will happen.
Primary telephonic interview is taking some time and there is no SLA for that.	After discussion with HR team an SLA has been fixed. Here, the team will take initial telephonic interview within 0.5 days after the receipt of the short listed CV.	Estimated duration will be 0.5day instead of earlier 1 day. Hence there will be a gain of 0.5 day.

Accordingly, the activities for the improved process flow are shown in *Figure 5*.
Here, the cycle time (LTR) for the proposed process would be 6 days as compared to 13 days at present.

The list of changes suggested and potential benefit to be expected are tabulated in *Table 3*.

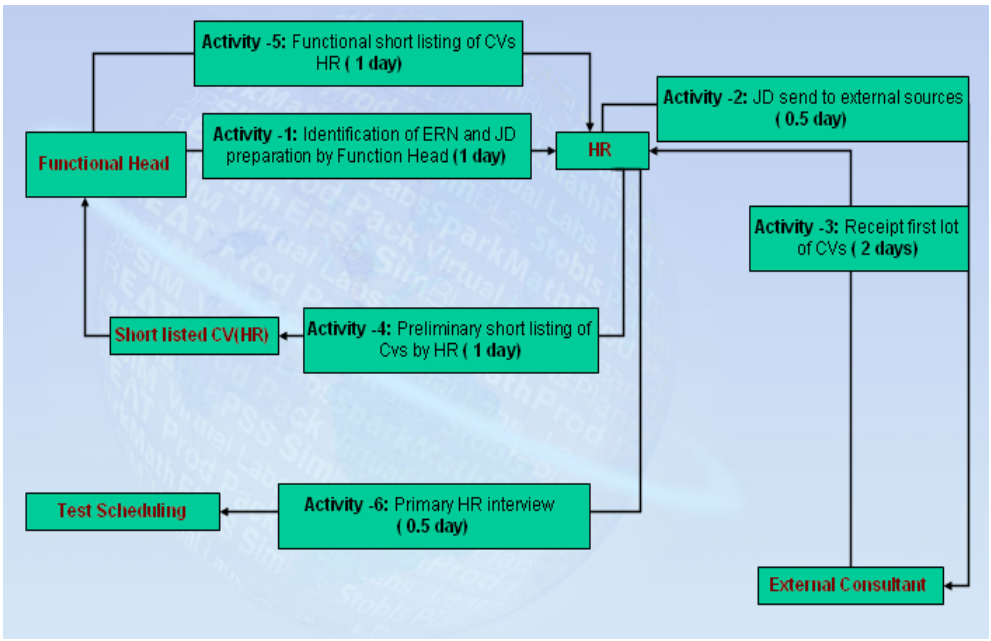

Figure 5. Activity Flow Diagram for the proposed process: Sourcing of Resume & Scheduling of Interviews"

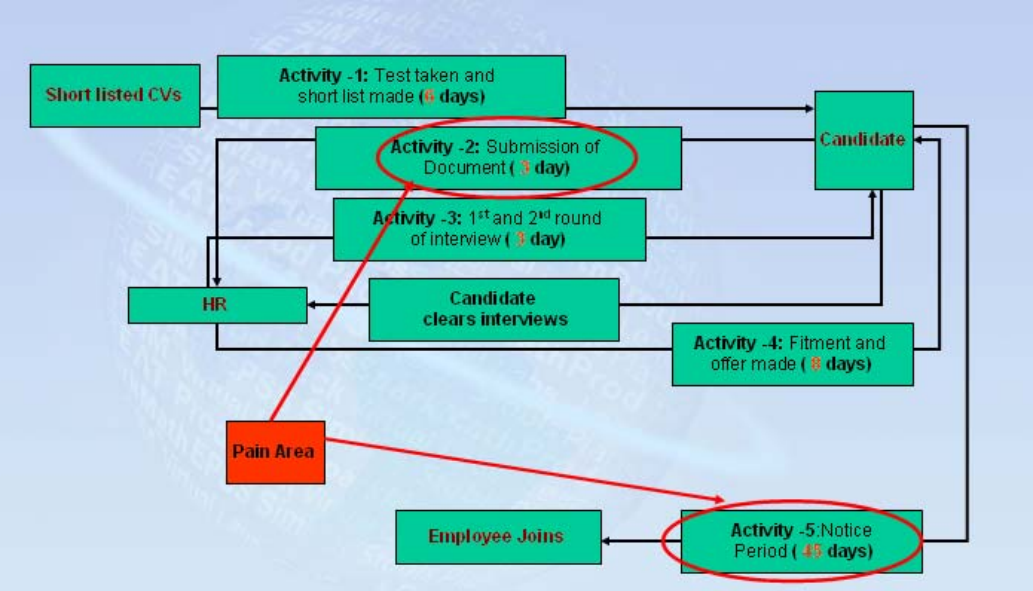

Figure 6. Activity Flow Diagram for the existing process: Test, Interview, Fitment and Offer Acceptance

Table 3. Proposed Changes and Expected Benefit

Present Process (LTR)	Changes suggested	Benefit
Time taken for local and out stationed candidate was 3 days on an average.	Strict monitoring should be started to complete this cycle within 2 days on an average.	Estimated duration will be 2 day instead of earlier 3 days. Hence there will be a gain of 1 day.
Presently prior to attending interview documents needed from candidates and generally takes 3 days.	Candidates have to submit their documents while attending the test and out-stationed candidate have to give soft copy via mail.	This step will be eliminated by processing it parallel to test, thereby expecting a gain of 3 days.
It has been seen that average notice period is 45 days.	Follow up the candidate with 30 days notice period.	Gain of 15 days in this process.

The major issues involved in this LTR process as observed from Table 3, for which corrective action plans are thought of, are displayed in *Table 4*. Accordingly, the activities for the improved process flow are shown in *Figure 7*.

Table 4. Top issues and action plan

Major Issues	Action Plan
Lack of the clarity of the requirement (Avg. time: 5.5 days)	To introduce checks in the ERN database to reverse incomplete ERNs (New Avg. time: 1 day)
Delays in functional short listing of the resumes (Avg. time: 4 days)	To reduce the delays in functional short listing of the resumes (New Avg. time: 1 day)
Administration and Evaluation of the test (Avg. time: 11 days)	Administration and Evaluation of the test (New Avg. time: 9 days)
Delayed submission of the documents by the candidate (Avg. time: 4 days)	To expedite the submission of the documents by the candidate. Candidate to submit the documents at the time of HR interview. (New Avg. time: 2 days).
Long notice period to be served by the candidate (Avg. time: 45 days)	To expedite the joining of the candidate (New Avg. time: 30 days)
We have no control over candidate and hence after offering the job it is difficult to say confidently whether candidate will join or not.	Calculation of Lead time to offer may be the correct measure for measuring the recruitment efficiency.

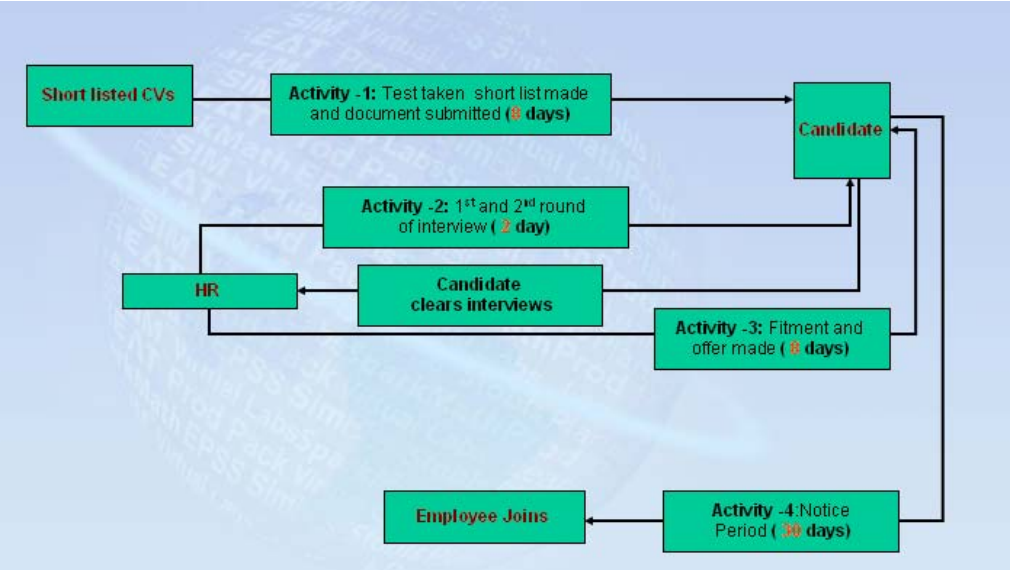

Figure 7. Activity Flow Diagram for the proposed process: Test, Interview, Fitment and Offer Acceptance

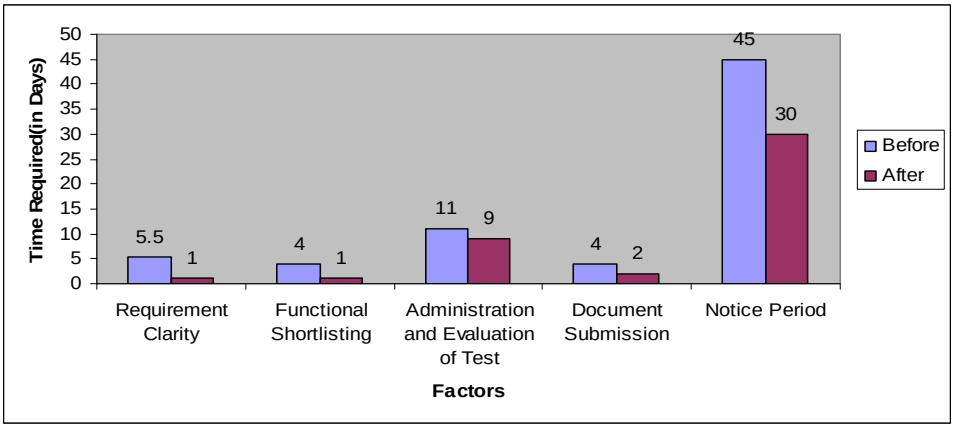

Figure 8. Time required for current major issues and action plan

Benefits: After implementing the proposed action plans to resolve the most concerned issues, the average LTR is reduced to 43 days from 77 days (*ref. Figure 8*). The study was done for 55 new recruitment cases and improvement percentage is found as 44%. This quality initiative was taken by the HR-Recruitment team and they have been successful in reducing the LTR.

3. CONCLUDING REMARKS

The paper discusses how quality improvement started in the industries. Quality improvement has become the most important tool of the organization for doing continuous improvement in order to sustain in the business. From Inspector lead process to Six Sigma, quality initiatives have also been matured with the passage of time..

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