



# Building Resilience by Improving the Quality of Design of crypteur IP amidst COVID -19 Pandemic in Indian telecom industry through strategic implementation of the Total Quality Management in their System Development Process.

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**Abstract:** This paper explains the vitality of Total Quality Management towards the strategic implementation in the system Development Process of Crypteur IP Quality of Design. Its constraints the 7 tools of Quality and management tools along with new 7 tools for the attributes which have been commonly adopted during the system development Process of the crypteur IP designed by the Indian telecom industry thereby improving the quality of design amidst the COVID-19 Pandemic. It 14 key areas in the quality management concept and how to achieve the system quality by the framework standards of crypteur IP. Last but not the least, it explains about instilling TQM in the crypteur IP system Development Process and provide recommendations to TQM aspirants to adopt the reformation methodology due to COVID -19 for Strategic Implementation of TQM.

**Index Terms** - Crypteur IP, COVID-19, Reformation, Quality of Design, tools of quality, Indian telecom Industry, TQM.

## I. INTRODUCTION

The current situation in India is really alarming due to COVID -19 Pandemic, Situation call for operational /war mitigation Methodology especially while designing the crypteur IP by the Indian telecom industry. The baseline strategy during this mitigation technique is the Total Quality Management (TQM) which will enhance the quality of design during the system development. The age-old conventional strategy is that if a product is made; someone will buy it not based on the quality of design; it is based on the reliability of the matured design of the developed process. During the COVID-19 Scenario the economic growth has been hit very badly, at this rate the company growth will be drastically affected. But the competition is growing exponentially in the electronic spectrum. Customer satisfaction is the key role [1]. Crypteur IP which is used in this paper is cipher equipment which is used in collaboration with other devices to provide ciphering cover for simultaneous transmission of speech, telex message and data over point-to-point communication system based on Duplex RR, Optical Fiber Cable Links, Carrier Quad Cable or two twisted pair cables. Conventional Philosophy for the Quality of design for the Crypteur IP is as follows:

- a) Conformance to specifications.
- b) Degree of Non-Conformance.
- c) Quality control
- d) Precipitation of latent and Patent Defects
- e) Reliability of the design
- f) Employees Involvement and Commitment.
- g) Competency Verification and Capacity Assessment of the Source of supply are short term and cost oriented.

The Theatrical evidence of TQM concept is not one night stand; it is a combination of various processes starting from infant mortality stage to its wear out. Initially statistical tools were used to mitigate the deviations during system development /product evaluation. Total Quality Management is a one solution for maximizing the profit, minimizing the cost, control growth with customer expectation. The very purpose of this paper is enhancing the quality of design for the crypteur IP which in turn increases the reliability of the system under development through Total quality Management.

## 2. Quality of Design.

The term quality has numerous definitions, and it can be custom defined. The expectation of Quality of design for the crypteur IP, during the infant mortality stage is very high as the scale parameter is greater than one "Gamma function". How far the traditional ethics of Total quality Management deviate due to the current COVID -19 Pandemic are enumerated below:

- Conformance to specification wherein the system requirement specification has been correctly captured by the Designer.
- Metric for measuring the Quality of design is based on definite continual process improvement and customer expectation.
- Mitigating the Risk indentified.
- Well defined Quality controls for the system development.
- The precipitated Defects are eliminated using process control tools.
- Quality is the primary parameter for any system development especially crypteur IP.
- Every Dick and Harry in the Indian Telecom industry is responsible for the Quality of design.
- Competency Verification and Capacity Assessment of the Source of supply are now should be long term and Quality oriented, like green channel.

## 3. Block diagram of Crypteur IP

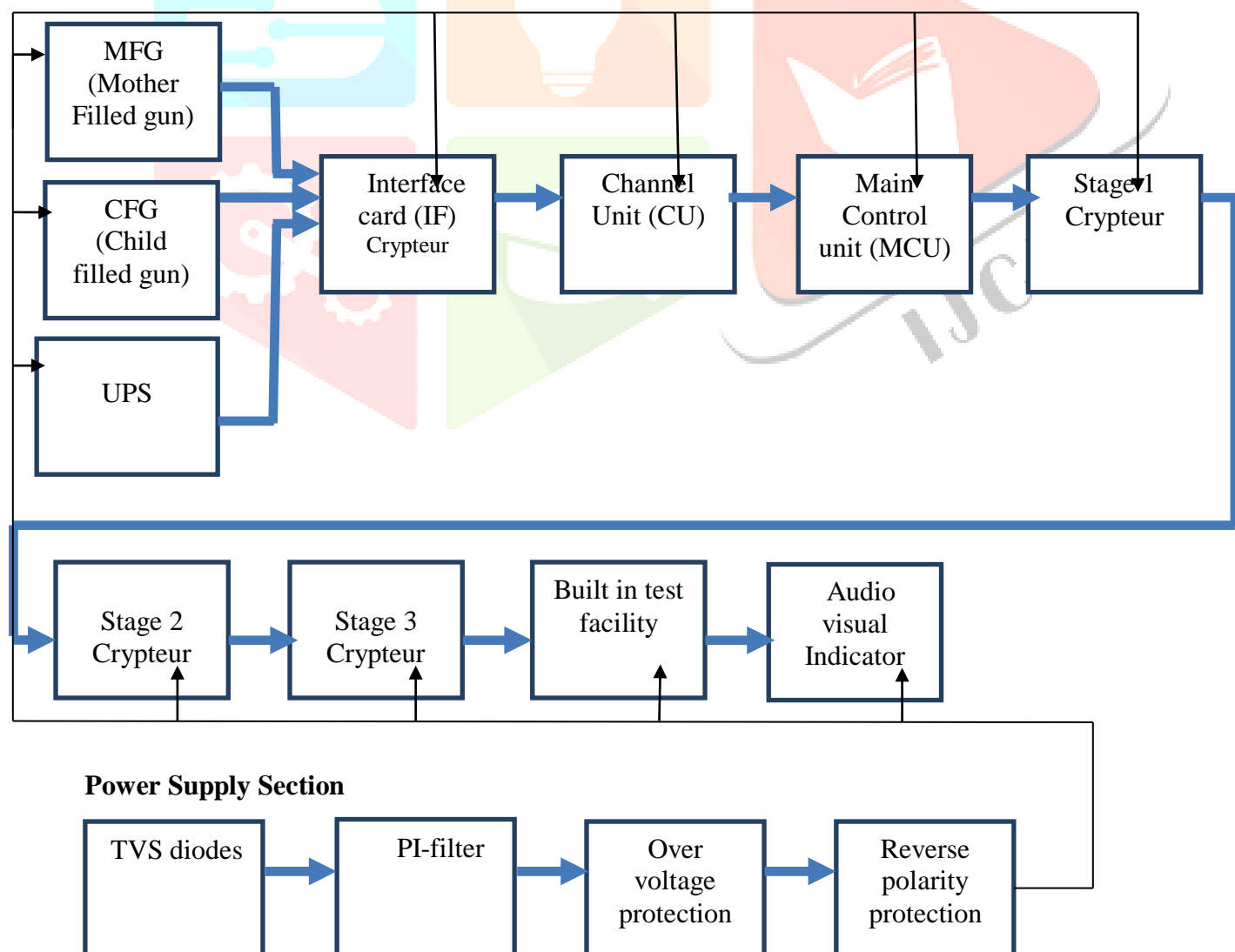


Figure 1. Block Diagram of crypteur IP

#### 4. Brief Description of crypteur IP

The primary output of Power supply section is +5V/5A. The input is either 230V AC or - 24V/-48V DC (Battery). The power supply normally works from 230V AC. Only when AC input is absent or beyond the specified limits, it draws power from DC input. The +5V output is un-interrupted when the input is either from AC or DC. Protections like reverse polarity for DC input, output short circuit, Ground to Neutral voltage greater than 3V, output over/under voltages are provided.

Next is the interface card which interfaces with many to one device for input clear data, sending out decrypted data. It interfaces with the line driver or other transmission equipment for sending encrypted data and for getting encrypted input data from far end. It converts the 4 Mbps balanced High Density Bipolar data to Non return to zero and vice versa. The data so taken from many to one device is converted and sent to Channel unit (CU) for encryption. After encryption from CU, the encrypted data is converted to High Density Bipolar data format in I/F card and is sent to medium. Likewise, the encrypted data High Density Bipolar data format from medium is converted to Non return to zero and sent to CU for decryption and vice versa.

The Channel unit does the process of encryption and decryption. It interfaces with interface card for the Non return to Zero data for Encryption & Decryption and sends back the encrypted and clear data to I/F card for High Density Bipolar data conversion. It interfaces with Main Control Unit for key transfer and key change. The Enciphering and Deciphering of the data are done through FPGA. The equipment comes preloaded with default keys. As and when there is a requirement to change the keys, first the keys are loaded from the Mother Fill Gun to the Child fill Gun and then the keys are transferred from Child fill gun to the Main control unit of equipment.

#### 5. Strategic Implementation of TQM on crypteur IP

The strategic implementation of TQM for this system Development during the Current COVID-19 Pandemic is appended below:

- a) Proper training on crypteur IP will continually implement the total quality management. Employees of the research team must be trained on the usage of tools and principalities of the total quality management which may be added as evaluation criteria during their annual appraisal.
- b) Expulsion of barricades like miscommunication should be removed between all stages of the Employees of the Indian telecom industry in their respective functional areas.
- c) During competency verification care should be taken by the Indian telecom industry that the source of supply also obeys total quality management tenets.
- d) Employee involvement and commitment across all stages of the Indian telecom industry without fail should be adhered to. Employees who are involved and committed should hold on to accountability and responsibility for the design of crypteur IP.
- e) Quality should be built into the crypteur IP starting from the infant mortality stage of the design which follows the Gamma distribution for the Analysis.
- f) Seamless usage of quality control tools in the design of crypteur IP by the Indian telecom industry limited. Indian telecom industry should adopt Quality improvement tools for the variables in the design of crypteur IP in the same order of check sheet, Bar graphs, histogram, cause effect diagram, Pareto chart, Scatter diagram and control charts in sequential manner [4]. Similarly for the attributes of the design of the crypteur IP the affinity diagram which is the output of the brain storming, based on the PERT and CPM the flowchart is drawn and it is termed as arrow diagram, when there is a usage of two different attributes to be compared the usage of then matrix diagram is must, if matrix diagram does not solve the problem the usage of matrix data analysis diagram is envisaged, Indian telecom Industry commonly uses process Decision Program chart and the causal model (relations diagram) for the crypteur IP Quality of Design, The

functional decomposition chart should be applied to the design of crypteur IP to cast the interrelations among goals, measures, processes and activities which give raise to the tree diagram.

### 6. Deming 14 C key points of Total Quality Management Method.

Apart from Walter Shewhart who is the father of measurable quality control framework. It was Deming who identified the seven deadly diseases and barricades for the strategic execution of the Absolute quality Administration.

- a) Consistent augmentation of product and services.
- b) Current tenets of total quality.
- c) Conclude interdependency on mass inspection in order to accomplish Quality.
- d) Ceasing the custom of honoring a business based on Price.
- e) Constant Augmentation of system production.
- f) Coaching on the job.
- g) Consecrate Leadership.
- h) Cast away Job diffidence.
- i) Collapse the indifference between Employees across the spectrum.
- j) Counsel banishment and the banishment of slogans against employees.
- k) Classical standards, goals and numerical quotas banishment.
- l) Craftmanships' pride needs to be banished.
- m) Continue to hold everyone through education programme.
- n) Change will happen if everyone is put to work.

The entire 14 points by Deming is shrinked into categories (i) Domino Effect Diagram ;(ii) Ceaseless Continual flow diagram.

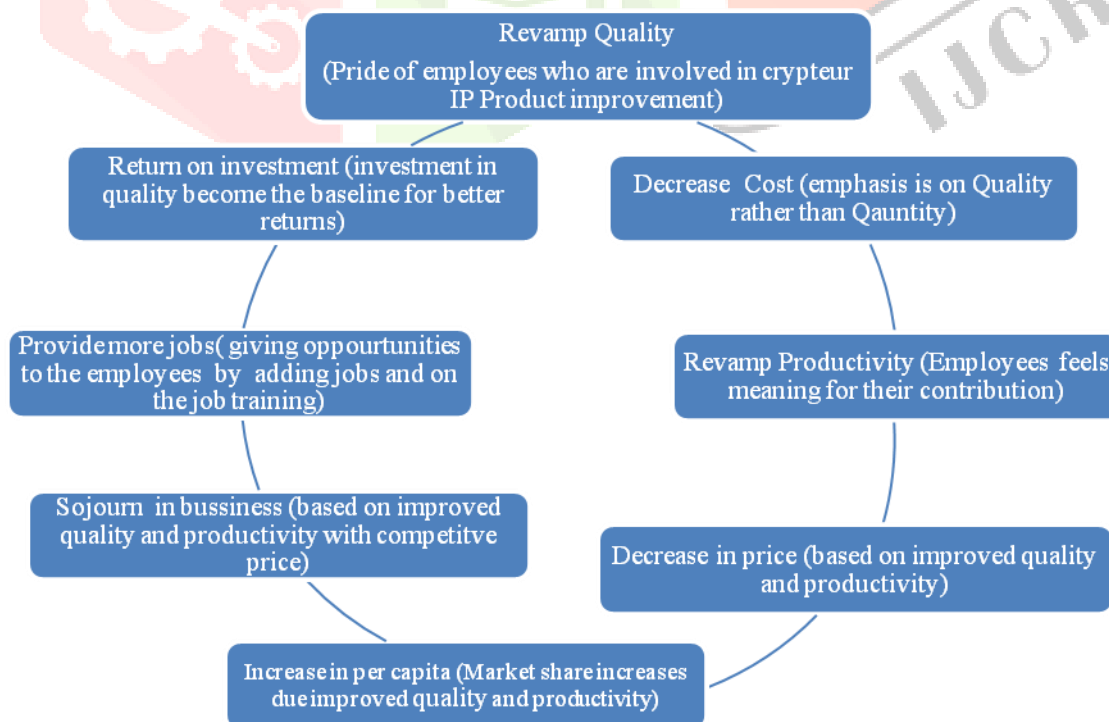


Figure 2. Demings Domino effect diagram for crypteur IP

In this the emphasis is on the reduction of cost by revamping the quality, Quality should be built into the system of crypteur IP. When the Cost is reduced more oppourtunities are available and employees are competent enough to make use of the oppourtunity.

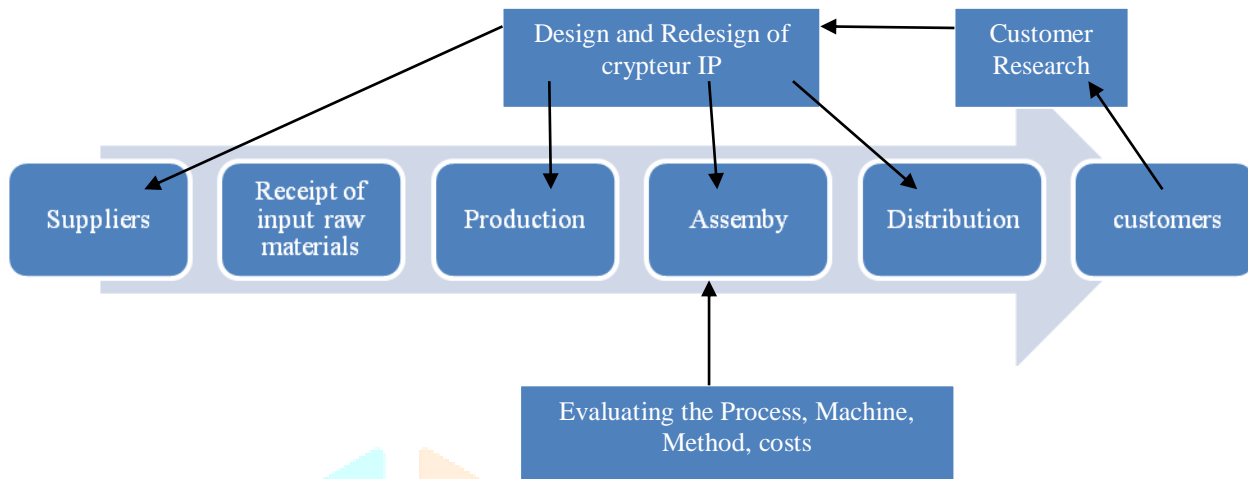


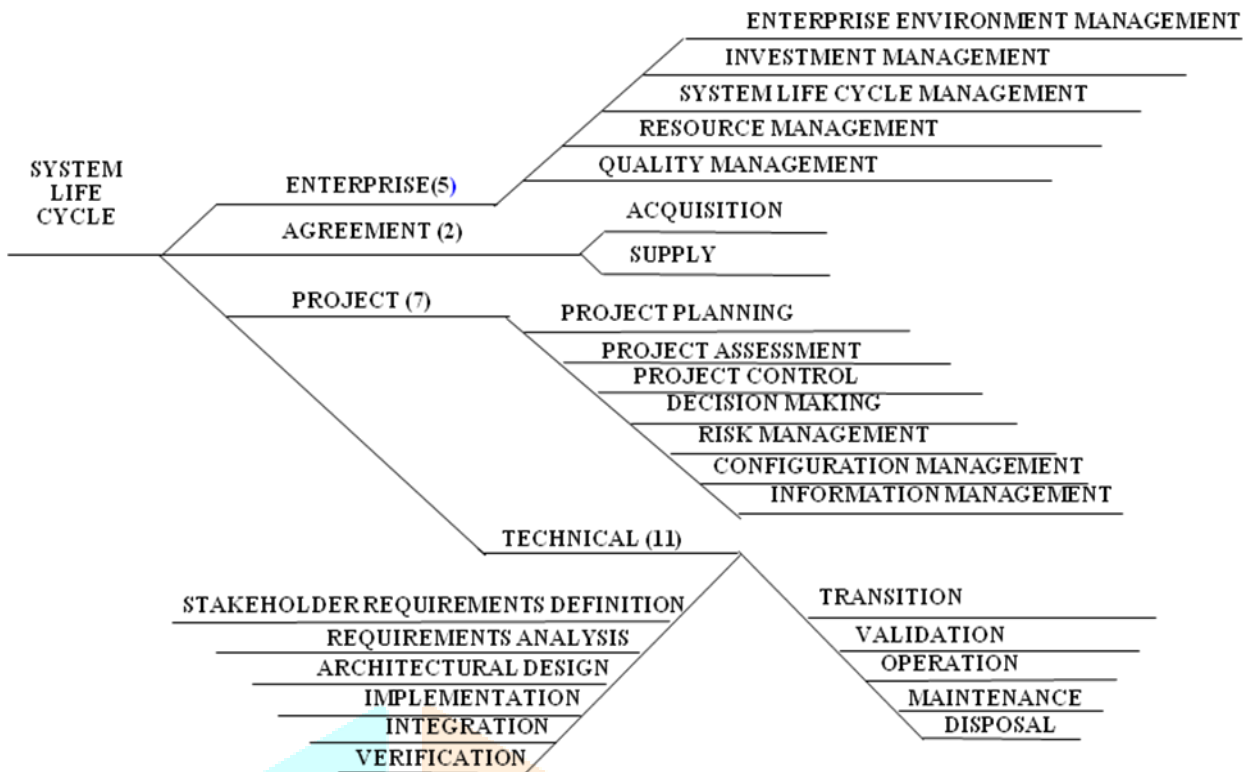
Figure 3. Demings Ceaseless continual Flow diagram for crypteur IP

Innovation is far more better than that of revolution along with contunial improvement in respect to crypteur IP Quality of design by the indian telecom industry. There is no point in changing the Supplier if their frequency is not matching, the best advice is to deal with the same supplier and resolve the conflicts for quality of design.

## 7. System Improvment Process for crypteur IP using Total quality Management

### System Development life cycle for a crypteur IP

An organizational life cycle process of Crypteur IP using the Total quality, the board characterizes the fundamental exercises of the administration, including project the executives, identified with the execution of a daily existence cycle measure. The initial activity is the Initiation & scope definition Phase which includes the task such as establishing the necessities for the board, Checking the assets like work force, materials, etc and Modifing the requirements to achieve criteria. The next Phase is the Planning Phase which includes activity like Planning the efforts, schedules, tasks, duties, costs. The consequent Phase which is of vital importance is the Execution & control Phase which includes task such as Implementation of plan to meet objectives Monitor, Process Investigation, resolving the problems and Reporting the progress made. The final but one Phase is the Review & Evaluation Phase which include task such as Ensuring the products and plans are evaluated, Assessing the evaluation of the results so obtained. The final phase is the Closure Phase which includes task such as Determination of when the process is complete and to Check the results for completeness.



**Figure 4. System Development life cycle process for crypteur IP**

The ultimate aim of the Indian Telecom industry is profit which can easily be obtained by revamping quality, decreasing the costs. Through the strategic implementation of the Total quality management Indian telecom industry limited nevertheless settles down for current level as it adopts the Continual improvement process in the quality of design of the crypteur IP, they every time settle down for a new benchmarking which is in the positive coordinate. Empowering the employees with the Prowessness to claim their new benchmark at the starting stage itself.

**Table 1 Phases adopted during the design of crypteur IP by the Indian telecom industry**

System development Life cycle Phases	Business Development Mode (BDM) Phases	Objectives
Requirement definition by the stake holders	Formation of General staff qualitative requirement by the acquirer	This is the most important document as it defines the requirement of the whole project.
Requirements Analysis	Contract	To initiate the scope statement. To start an undertaking and direct expense/advantage examination just as achievability study.
	Statement of work	
	Organization process Charter	To characterize project scope, dissect the current framework, and characterize data necessities, information ascribes, and framework destinations.
Architectural Design	System Design Scope statement	To distinguish and assess substitute framework plans and get ready starting undertaking plans.
	System Specifications	To determine information stream, client/framework interface, framework controls, and manual supporting methods.
	Deviation Process	To determine handling rationale, document structure, module interfaces, and framework engineering. Project plan and test plan. Scope management plan. Work breakdown structure and

		<p>activities.          Estimation.          Milestones.          Schedule network diagram.          Resource plan.          Cost estimation and budget.          Quality plan.          Staffing plan.          Organisation chart-reports and records.          Risk plan.          Communication plan.          Activity resource plan.</p>
First off production model	<p>Product Development          Project plan and test plan.          Scope management plan.          Work breakdown structure and activities.          Estimation.          Milestones.          Schedule network diagram.          Resource plan.          Cost estimation and budget.          Quality plan.          Staffing plan.          Organization chart-reports and records.          Risk plan.          Communication plan.          Activity resource plan.          Deviation Process.</p>	To transform initial design with specifications into a model acceptable by the customer.
Implementation	Testing	To implement the system being developed throughout the system development life cycle.
Integration	Change request Installation	<p>To convert the specifications that is defined in the general staff qualitative requirement arrangements and techniques for the new framework.</p> <p>To introduce the equipment and programming for the new framework, and cutover the framework into creation.</p>
Verification	Post Execution Audit /Maintenance	To screen and keep up the quality and execution of the new framework.
Transition	Change request Root cause analysis Execution status Execution triggers	<p>Re planning          Corrective action          Preventive action</p>
Validation	Project deliverables Project acceptance	<p>Baseline artifacts          Closure report          Process improvement</p>

## Relationship between Deming's 14 C key points to the crypteur IP designed by the Indian telecom industry

The following are the discussion on the crypteur IP life cycle developed by the Indian telecom industry limited:

- a) **Consistent augmentation of product and services:** The crypteur IP so designed need to first off production model and there starts the domino effect and ceaseless continual flow of improvement. The designer and the producer are accountable and responsible for the quality of design. Any precipitation of patent and latent defects is the full responsibility of the designer and the producer/Manufacturer. Care should be drawn for the risk mitigation plan and technique.
- b) **Current tenets of total quality:** Employees of the Indian telecom industry are wholly responsible for the building the quality into the crypteur IP. Miscommunication should be strictly avoided.
- c) **Conclude interdependency on mass inspection in order to accomplish Quality:** if the defects are precipitated in the design stage itself cost is much reduced than being precipitated at mass production. The Cost involved is exponentially high.
- d) **Ceasing the custom of honoring a business based on Price:** when subcontracting the design to a source of supply care should be taken based on competency verification and capacity assessment that the contract is not awarded to the least quoted in the tender. It may so happen that the particular may compromise the quality and quote as lender during tender demonstration.
- e) **Constant Augmentation of system production:** Augmentation in respect of method, paradigm, framework standards, standardization, metrication, techniques, tools policy and procedure need to be adopted.
- f) **Coaching on the job:** knowledge is the foremost important tools for a designer.
- g) **Consecrate Leadership:** knowledge and wisdom are the skill sets for the employees of the Indian telecom industry for the designing of crypteur IP. Usage of tools is a must for all spectrums of employees.
- h) **Cast away Job diffidence:** Quality circles should be organized at regular intervals; wherein the employees are allowed to express their views without fear and prejudice. In quality there is no hierarchy, everyone is equally important irrespective of their grades.
- i) **Collapse the indifference between Employees across the spectrum:** Education and on the job, training are the two major tools to collapse the indifference between employees across the spectrum in the Indian telecom industry for the design of crypteur IP.
- j) **Counsel banishment and the banishment of slogans against employees:** than concentrating on the negative attributes of the employee, Management should concentrate on the positivity of employees which will improve the work quality of the employees of Indian telecom industry for the design of crypteur IP.
- k) **Classical standards, goals and numerical quotas banishment:** Quotas which are measured in metrics, goals which are measured in timetables, and work guidelines which are measured as unit abscissa in term of times addresses the zaheln, Nacht quality. A failed crypteur IP design results in huge cost and precipitate defects and it will serve no purpose. Annual appraisal should be used as a motivation tool rather than punishment which will result in rework, errors, and waste.
- l) **Craftsmanship's pride needs to be banished:** Positively motivated employees of the Indian telecom industry for the design of the crypteur IP will do quality work. Negatively motivated employees should be educated, and, on the job, training should be given.



**m) Continue to hold everyone through education programme:** The employees of the Indian telecom industry should be educated about the recent trends and on the job, training should be given to reap benefit from the employees.

**n) Change will happen if everyone is put to work:** when strategically implementing total quality management in the Indian telecom industry limited, all the employees should be given the charter of duties without exception.

## 8. Conclusion and Recommendations

Quality of design in respect of crypteur IP by the Indian telecom industry during the current pandemic of COVID-19 need to adopt the 14 C key points, if their ultimate objective is to maximize the profit by reducing the cost. Revamping the quality by building the quality into the system during the infant mortality stage helps in reducing the cost which can be analyzed using the gamma distribution. Employees of the Indian telecom industry should be involved and committed during the COVID-19 thereby increasing the productivity by first off production model, which in turn increases the profit and minimize the cost. The knowledge and wisdom which obtained from the tenets of Total Quality management will increase the employees' commitment and involvement of Indian telecom industry. Indian Telecom industry which had implemented the Total quality Management in the system development of crypteur IP has involved their Committed Employees during the COVID-19. The entire spectrum of Employees without the grade difference should understand the Total Quality Management tenets to grab the opportunity for the quality of design through incentives, training, methodology, framework standards, relationship through quality circle had resulted in successful implementation of TQM

Employees' development programme and conferences with sponsors can be organized for the execution of the complete quality Administration. Continual improvement with new benchmark needs to be set for the domino effect of the Demings 14 C's. Ceaseless continual flow will allow the committed Employees of the Indian telecom industry to build in the quality into the design of crypteur IP. Quality of design conforming to specifications will boost the morale of the employees. The degree of Non-Conformance will have negative impact on the employees' involvement and commitment. Quality control procedure is one of the important tools for the first off production of the crypteur IP. The precipitation of latent and Patent Defects will increase the benchmark that has been set by the total quality management on the Indian telecom industry limited. The Reliability of the design of the crypteur IP has increased due to the strategic implementation of the Total quality Management by the Indian telecom industry limited. Employees Involvement and Commitment through the education programme set a new paradigm in setting a breakthrough in the design of crypteur IP. Competency Verification and Capacity Assessment of the Source of supply should be long term rather than are short term and quality oriented rather than cost oriented. The size of the team should be kept minimum due to COVID-19 and the tenets of the total quality management should be adhered by everyone in the team. Business development mode was adopted during the design of the crypteur IP by the Indian telecom industry limited which is continually improved in phased manner for successful implementation of total quality management.

Systematic risk is the only independent variable for the CAPM and inflation, interest rate, oil prices and exchange rate are the independent variables for APT model.

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