TECHKNOWLOGIES

Approach Paper for

NPI Lean

SCENARIO BUILDING

In the human history, the 20th & 21st century witnessed dramatic inventions which have revolutionised the way in which the mankind lives. The product obsolescence due to better substitutes has been the highest in the last century. To give an example, Telegraph to Telex to Fax to Email to Video-conferencing. The evolving substitutes have significantly reduced the lifecycle of existing products, thus necessitating rapid New Product Introduction (NPI).

In the pre-globalisation era of protected economy, Indian industries could survive even with the products of outdated technology developed by their collaborators long time back & still managed to make significant profit. In the post-globalisation era however, the state of the art products are made available at a very competitive rate, almost off the shelf. Indian consumers stood in the queue to buy outdated products, sometimes even paying premium because of the lack of choice. From the time of independence till the economy opened up, Indian industries hardly focused on New Product Introduction and they could comfortably survive with outdated products as it was a seller's market.

In the underdeveloped and developing countries, most of the companies relied on their collaborators for product & manufacturing design. Often these companies were taught the *"know-how"* and not the *"know-why".* On most of the occasions, the machineries & tools were supplied by the collaborators & the expatriates taught people the *"know-how"* namely – how to manufacture & not the *"know-why"* namely – how the products & processes are designed. In summary, in the entire value-chain of the manufacturing model, the most neglected & underdeveloped function has been the Product & Process Design.

In this highly competitive post globalisation era, the only way Indian organisations can prosper is by introducing New Products that are capable of competing with the State-of-the-art technology. This requires a new Paradigm and a new Approach; which means that our outlook towards the New Product Introduction process needs a dramatic change using new methodologies & tools.

BUSINESS RELEVANCE OF NEW PRODUCT INTRODUCTION (NPI)

The growth of the company, to a very large extent, depends on the income from the new product. The international benchmark is 20% to 30% income coming from new products introduced in less than 1 to 2 years period. Compared to this benchmark, Indian industries' average is pretty low. In order to achieve this business objective, the competency of the New Product Introduction team is of paramount importance.

In a manufacturing model, there are 3 different roles namely- *Brahma, Vishnu & Mahesh*, where the creator 'Brahma's' role is played by the New Product Introduction, the sustainer 'Vishnu's' role is played by the Operations and often the destroyer 'Mahesh's' role is played by the customer. Depending on how active the competitors are and how efficient their product is, the life of a new product offered by a company will be decided. In the current scenario in India, the success rate of new products is negligible compared to that of the international standards. The major problems faced by the engineering companies with respect to new product introduction are as follows:

1. Poor acceptance of the new product by the customers
2. The product features fail to meet customers' expectation
3. Long lead time for development
4. The value for money as perceived by the customer is low.
5. High infant mortality rates and defects experienced by the customer
6. The serviceability of the product is poor

In essence, the New Product Introduction process and the competency of Product Designers is a major concern that needs to be addressed for overcoming the above difficulties faced by the Indian industries.

TRADITIONAL NEW PRODUCT INTRODUCTION

Historically, New Product Introduction is entrusted to the Design-Engineering department in a Functional Organisational structure. Often, the product development commences based on limited or nil input from the customer; and the designers develop the product based on what they think is the requirement of the customer. The Product designer develops the concept to incorporate the functionality assumed to be the requirement of the customer and works on the detail design. Many times, the prototypes are built and tested for meeting the specifications. Very limited reliability evaluation is carried out, apart from the limited validation trials in the field that evaluate the adequacy of the product in meeting the customers' expectations. Then the design department documents the design and releases it to production engineering department or manufacturing engineering department to develop the manufacturing facility. Invariably, the manufacturing engineer/designer sends back the product design highlighting several manufacturing difficulties. Eventually, these two silos resolve the differences after several iterations. And then the drawings move to the purchasing functions for sourcing of raw material and components & then the story repeats between the design and purchase department.

As the new product design progressively moves from one stage to another, namely - Tool Design, Tool manufacturing, Quality Assurance & Plant Design, it undergoes several modifications to suit the various downstream functional requirements. Eventually when the pilot trial of the

manufacture commences, new surprises which were not diagnosed earlier in all the previous iterations between functions, spring up and the designer gets busy in modifying the Product Design all over again.

When the new product finally crosses all these hurdles and goes to the market, there are further surprises from the customer when they actually use the product and that is the "Moment-of-Truth" for the entire NPI process. The traditional NPI process shows the product fails to meet even the basic requirements of the customer or has several defects which annoy the customers and reduces their confidence in the company. Invariably, one irate customer tells hundred others, thus reducing the probability of the new product growing rapidly and generating revenue for the company which is the primary motive of introducing new products.

Prognosis

The following are the probable root causes for the poor performance of the NPI process:

1. While designing the product, the latent needs of the customer and the benchmarking against the world class products is invariably neglected, leading to the inability of the new product to meet and exceed the customers' expectations.
2. The classical functional organisational structure adopted by any manufacturing model is found to create silos of specialization; each one of them has a significant contribution to the success of the New Product Introduction.
3. The design department predominantly focuses on the product meeting the functional requirements and the manufacturing feasibility is often ignored as the designers have limited exposure or knowledge of the downstream activities.
4. The designer takes several decisions which have a conflicting requirement with the suitability of the new product for storing, manufacturing, procurement, packaging, transportation, installation, servicing, testing, etc.
5. All the above leads to lots of Non-Value-Adding activities such as:
    a. **T**ransportation of document and information between the functional silos all the time which adds no value.
    b. **I**dle time between the functional departments waiting for their feedback
    c. **M**odifications of design, process, layout, etc. which could have been first time right, saving time and resources
    d. **W**asteful material of scrapping tools, dies and components or rework across the various stages of NPI
    e. **O**ver-processing of the design functionality for which the customer is not willing to pay.

f. **O**ver-deployment of resources for frequent discussions and modifications across functional boundaries contributing to high cost of development.

g. **D**efective components and products in the manufacture contributed by design inadequacies.

From the forgoing discussion, it is evident that the traditional NPI will not be able to meet the 21st century customer demands and needs although it gave advantage in the earlier era where the product lifecycle was pretty long and the customers were not demanding. The most important difference between operations and NPI is the latter requires Project Management approach with a multi-disciplinary involvement. Hence, trying to launch the new products through the same Functional Organisational Structure and processes is equivalent to putting a square peg in a circular hole. In order to achieve First-Time-Right new products, at the shortest lead time, optimum costs that meet and exceeds the customer requirements require a new paradigm and process.

SSA TECHKNOWLOGIES, which is an off-shoot of the flagship company SSA Business Solutions, identified its purpose to transform the paradigm of New Product Introduction in this country by offering various change management solutions focusing on the designers' community. Among the various offerings, SSA Techknowlogies empowers the Indian Industries to adopt the world class NPI process and endeavour to develop the Designers' competency to offer state-of-the-art new products.

Anticipating the demand, **SSA TECHKNOWLOGIES** provided the thought-leadership of applying *LEAN* concepts to the NPI process, a glimpse of which is given below.

NPI[LEAN]

What is Lean?

Lean is a philosophy which challenges the waste in any value stream, systematically evaluating every activity and classifying them as value added, non-value added and Business value added activities. A value adding activity primarily is the one that is performed by the organisation for which the customer is willing to pay whereas a Non-Value Added (NVA) is the activity consuming resources but does not add any value to the customer. The business value added activities are the activities performed by the organisation which may not be for the customer but for the sake of the other stake holders. With this definition of LEAN, the manufacturing systems are often redesigned to eliminate the NVAs, thereby creating flow and flexibility which eventually reduces the lead time significantly in addition to optimising the costs.

In summary LEAN aims the following:

1. Reduction in lead time by more than half
2. Zero inventory in the pipeline
3. Flexibility to produce multiple products
4. Optimization of resources thereby reducing costs

What is NPI^{Lean}?

Although the LEAN philosophy came from the manufacturing discipline and is extensively applied for re-engineering the manufacturing value chain, the principles of lean is also applied for studying the inbound & outbound logistics of any manufacturing model to achieve the above Lean objectives. In essence, lean offers methodology & tools to carry out a systematic investigation of any value chain. A value chain is a collection of business processes that convert an input into an output. For e.g. the raw materials converted into a motor car go through various processes called the value chain. The reason why it is called a value chain is it converts raw material to finished goods, thereby adding value at each stage. The chain refers to linking one process to the another.

Extending the above logic, a NPI process is also a value chain which converts the customer requirements into a tangible new product. As in the manufacturing value chain, the NPI process also has several business processes linking various departments across the entire organisation. The principle difference between a manufacturing value chain & NPI value chain is that the NPI value chain starts from the customer & ends with the customer virtually covering the distribution and after sales network.

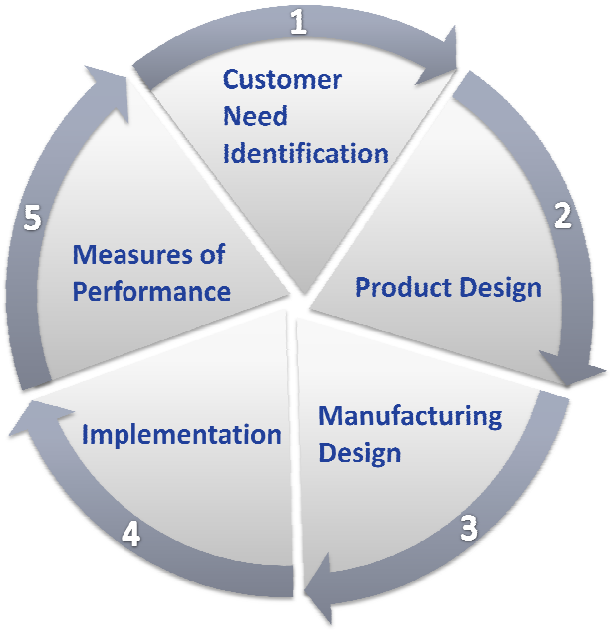
The challenges & objectives of the NPI process are almost identical with that of the manufacturing system. The concept of waste in manufacturing is referred as TIMWOOD (Transport, Inventory, Motion, Waiting, Over-processing, Overproduction & Defects) which is targeted for elimination in order to achieve shorter lead time for manufacturing First-Time-Right products at optimum costs. In the same manner for NPI, the wastes as TIMWOOD *(refer earlier stated clause no.5 in Prognosis)* are similar which the NPI^{Lean} eliminates by re-engineering the NPI system. Hence, the objective of NPI^{Lean} is to achieve the following:

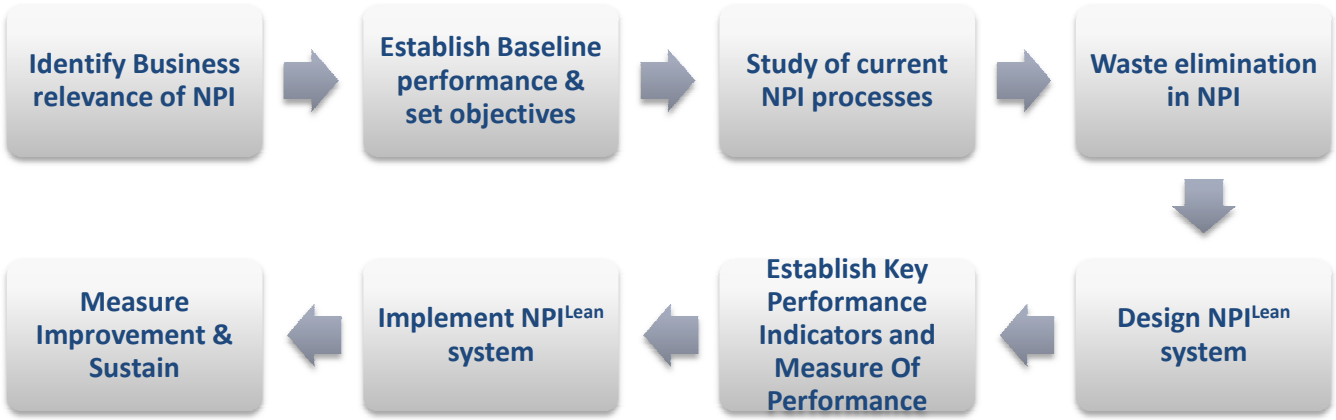
1. Reduction in NPI lead time by less than half
2. First-Time-Right new products that meets and exceeds the customer expectations
3. Reduction in the product development costs
4. Optimization of resources of downstream activities
5. Less hassles in manufacturing the new product
6. Higher reliability of new products

NPI^{LEAN} APPROACH

Approach model

The following diagram illustrates the NPI^{Lean} Implementation approach:





Consulting Work-packages

SSA Techknowlogies has developed a unique consulting package to systematically study and apply Lean principles to NPI process which involves the following work packages.

Details of Consulting Package

1. Scoping study to formulate strategy for NPI^{Lean}
2. Top Management enrolment workshop
3. Champion Training for the Functional Head *(As required)*
4. Formation of team for internalising NPI^{Lean} process
5. NPI^{Lean} Foundation Training to the team covering the RMAOR© methodology
6. NPI "AS-IS" VSM workshop
7. NPI^{Lean} Tools and Techniques Training *(As required)*
8. Data collection & establishing the NPI^{Lean} objectives
9. Creation of Future State NPI^{Lean} Value Stream
10. Design of NPI^{Lean} Systems, Structure & Manual
11. Design and document NPI^{Lean} Processes *(Flowcharting)*
12. Selection and implementation of suitable PLM (Product Lifecycle Management) software
13. Implementation and handholding.
14. Establish Measure of Performance & Key Performance Indicators including tracking and monitoring system.

HIGHLIGHTS OF BEST PRACTICES IN NPI ^{LEAN}

The NPI^{Lean} developed by SSA Techknowlogies incorporates the following best practices which are normally absent in the traditional NPI process. In this connection, SSA Techknowlogies offers Training & Consulting packages in these best practices.

1. Tools and Techniques for identifying the latent needs of the customer which can be factored in the New product – Quality Function Deployment
2. VOC benchmarking technique which enables to identify the CTC (Critical to Customer) requirements from the VOC (Voice of Customer) and benchmark against the best in class products
3. Application of Design For Manufacture technique with a software support in order to optimize the component count in the design at the concept stage itself
4. Application of Design For Assembly technique with a software support in order to evaluate and optimize the assembly costs of the new products even before detail designs are undertaken
5. Statistical Tolerancing techniques which helps to optimize the tolerancing of the new products thereby reducing the costs
6. Application of DOE (Design Of Experiments) technique for evaluating the new products in a more scientific manner
7. Reliability estimation techniques with the aid of MINITAB software which will enable the designers to design products with higher reliability

8. Application of risk assessment tools DFMEA & PFMEA (Design & Process Failure Mode Effects Analysis) both during the Product Design & Process Design Stages
9. Application of DFSS (Design For Six Sigma) principles factored in the NPI^{Lean} process
10. Application of Value Engineering principles both for Re-engineering & New product design to reduce the cost and retain the value to the customer

The above tools & techniques are available as a standalone package for Training & Consulting

SUMMARY

1. The globalisation has raised the bar for the need of the state-of-the-art new products
2. The future of Indian industries for growth lies in their ability to develop new products
3. The current NPI process & competency of the designers needs to be upgraded to the world class level
4. The traditional NPI process lost its ability to meet with the new challenges
5. The Non Value Added activities in the traditional NPI process consumes excessive resources and fails to meet the time and quality requirements.
6. Lean philosophy hitherto applied to manufacturing system re-engineering can be applied to the NPI process for eliminating the Non Value Added activities in the system
7. The NPI^{Lean} approach aims to cut down the Product Introduction time significantly and improve its success rate by meeting and exceeding customers' expectations
8. NPI^{Lean} is a holistic approach to NPI system which challenges the old paradigm of introducing new products through the functional org structure
9. NPI^{Lean} is complex project management with a multi-disciplinary involvement and decision making and hence require a multi-disciplinary approach
10. The need of the hour is to put the NPI process under microscope and adapt the Lean approach for prosperity and perpetuity of the organisation.

GLIMPSE OF SSA TECH CLIENTELE

S.No.	Industry	Industry Type	Services Offered
1	Emerson Innovation Centre, Pune	Industrial Design, Product Design & development centre for various Consumer Durable & FMCG goods.	• Institutionalising DFMA (Design For Manufacture & Assembly) practices across various verticals enabling part count and product cost reduction. • Facilitating DFMEA (Design Failure Mode Effects Analysis) & Control Plan techniques for Design teams to estimate the possible risks and failures for their products and controlling them in advance.
2	OPW-Dover	Fuelling	• Institutionalised DFMA (Design For

	Corporation, Thane	equipment design and development	Manufacture & Assembly) technique for part count reduction and product cost reduction.
3	Crompton Greaves Ltd.	Product Design & development of various Power Systems, Industrial Systems and Consumer Products	• Facilitated VOC Benchmarking for two divisions which rendered the roadmap and methods to collect and compare the needs of customers to integrate them in their products. • Institutionalised QFD (Quality Function Deployment) which enabled the project teams to incorporate the stated and latent needs of the customers in their products. • Facilitated for Tolerance Design institutionalisation for Senior designers
4	EMCO Ltd.	Transformer & Power Generation	• First Time Right Design in one product family
5	Maruti Centre Of Excellence	Automobiles	• Vendor Competency Programs involving Statistical Process Techniques & Measurement System Analysis
6	Jyoti Plastics	Plastic Components	• Institutionalised QFD which enabled the project teams for capturing latent needs of customer • Institutionalised Design Of Experiments • Facilitated for Design For Six Sigma for one product family
7	Mahindra Institute Of Quality	PG Diploma in Quality Management	• Conducted Programs in New Product Development