Chapter

Analysis, an Anathema: Is That a Fervent Diatribe of Lean?

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Abstract

Should there be an understanding that rigor in analysis must be out-of-bounds for Lean initiatives? Will this rigor not facilitate a benchmarking of Lean initiatives? Why not a Lean initiative cause-consequence assessment not performed for building future fault tolerance? The effectiveness of a company's strategy is critical to its success or failure. Lean strategy seems to be claimed as a widely recognized factor for business success and competitive advantage. However, empirical evidences do not promote the idea that Lean has delivered results every time. Study results indicate that success or failure of lean initiatives strongly depends on how companies approach it and on whether company has created their own curated philosophy towards Lean. Then, success is not dependent alone on a strategy, but on how daily operations are aligned to strategy. This chapter aims to address the above questions and a greater number of questions that we experience on a day-to-day basis with regard to Lean applications in the real world. Chapter Learning Objectives: Understanding Lean, Lean failure modes, and Lean initiative precautions.

Keywords: Lean, failures, assessment, arguments, 6Cs

1. Introduction

Why Lean initiatives are not analyzed independently and collectively to understand the failure modes that resulted in many failures firms conceded in the past? Why Lean is more 'appealing' to the corporate leadership when pros and cons of the methodology and its nuances are not well studied? Has Lean ended up as one of the many continuous improvement initiatives many organizations have undertaken as it does not demand long rigorous trainings, no expectation of quantitative acumen, no requirement of good historical data, decision on the effectiveness and efficiency outcome is completely within the ambit of the enterprise giving the ultimate flexibility?. Did absence of a structured methodology, benchmark and a third-party assessment has given the maximum convenience and performance priority low? By giving fancy terminologies such as transformation, high velocity development, out of the box idea generation, have we lost the direction and purpose?

Should there be an understanding that rigor in analysis must be out-of-bounds in lean philosophy? Is that absence makes Lean an affable, acceptable, and appealing slogan to a larger section during their attempts to cross the barriers in eagerness to reach the holy grail of excellence by quicker means. In total irreverence, if lean has to fail what more could be a bigger reason, when this strategy is recognized for the questionable characteristics in pursuit of agility, such as superficial management, reluctance to examine sustenance of accumulated benefits, and avoidance of

retrospective studies. So is Analytics, an inevitable villain, in the drive to excellence? Process mining and data analytics are integral to business excellence journey riding on and capitalizing the benefits of Lean, augmenting the methodology without missing its innate flavor. The new normal induced today's global economy, characterizes demand specificity, spend thrift consumers, substitute products, aggressive pricing, etc. has created a breed of customers who are demanding much more than ever. The innovate and compete has become imperative and inevitable norm of the day. Improve to sustain and survive, but not at the cost of bleeding reserves, rather by optimization and conserving. This can only be done by minimizing the manufacturing cost of products by increasing the productivity and reducing wastage during production. Therefore, the industrial organizations realized the need for efficient and effective use of resources in a way that justifies production economics [1]. Thus, these organizations tried adopting and adapting several strategies to confront this challenge, including the lean manufacturing strategy [2].

The concept of lean manufacturing originated in Japan with an intent to conserve funds by eliminating wastes by identifying sources of waste and then using tools to eliminate them. It is now widely publicized that organizations that practices lean manufacturing methods produces world class products that have significant cost and quality advantages over those who still practices traditional mass production. But, if we have to claim, Lean has its origin in Toyota Production system, then we also need to agree that the system at Toyota is integral to Toyota way of life and if another company has to replicate the same success they need to develop their own unique values, principles and priorities of life. The Toyota philosophy has evolved over a period of time over a value system that thrives on safety, security and motivation of their work force. Thus, Lean has to be a way of life that is unique to an implementation and cannot be a medication only at a time of illness rather it is a vaccination schedule for a life.

It is concluded from the available literature that the lean techniques are theoretically applicable in all industries and has proven their success in practice specifically in large organizations. It is the management style that sets the tone for employee attitude that determine the maturity of lean operations within a company and they set the culture of the lean organization [3]. The lean environment that takes undue advantage of the flexibility lean offers and the fear psychosis instilled by leadership to find a waste as a mandatory dictum together works counter-productive to leaning operations.

Despite its long existence, Lean has been moving with the tide set-up by socio-economic and political winds that prevailed at those points in time in the enterprise. Post world war2, the demands varied through the years as countries slowly regained their economic stability. During this time, the challenges determined, for what Lean must stand for. At times, it was shortage of skilled men and raw material then demand from Lean was optimum resource utilization, scarcity of storage houses forced to have zero inventory as a target. As economy got its boost, commerce benefited and demand certainly began to rise, then managing supply versus demand became a factor that created market advantage, hence Lean focused on quicker delivery with minimal steps to produce. Labor unrest, famines, pandemics and cost highlighted the need for Lean to focus on human resource management. Once commerce flourished and alternate products flooded, Lean turned attention to meeting productivity targets at reduced cost. Thus, during the tumultuous post war period, Lean revised, and improved its definitions, multiple times.

Overall, the management commitment, financial sponsorship, competency development, and culture; probably are majorly impacting lean operations. The rest of the chapter proceeds with a literature review that identifies the different

perspectives evolved in the prior papers. Then, research methodology explains the method adopted by the authors to complete this study. Then comes, arguments and discussion that outlines the various failure themes and then, there is an outcome recommendation that reflects the possible procedural precautions that may control the recurrence of potential failure modes, and finally chapter culminates in the concluding thoughts of authors.

2. Literature review

Lean is a combination of principles, practices, tools, and techniques with an aim to improve safety quality, cost, delivery, productivity and improvement by eliminating non-value adding steps. Further, lean is a continuous improvement initiative with an intent to implement business processes that with minimal waste and reduced lead times [4]. While elimination of wastes and direct implication on value perceived by the customer are heavily promoted, most of the success stories in Lean originates from Japan, while many of the failure stories finds their way from rest of the world [5].

With the decision of an organization to initiate the lean process comes the challenge of bringing about the change in the thought process of employees and work culture [6]. This is because lean is a way of working towards the elimination of waste across organization, thus a transition of behavior and methodology that may be deeply rooted within an organization is required. When an organization chooses to go lean, it hunts for waste across system, thus earns the distinction of being a socio-techno intervention.

A trust-based work culture is a precondition for lean intervention as leaning raises the anxiety of job loss in employees. The improvement process must be recognized as benefiting both the company and the employees. The ultimate responsibility for the outcome rests with the management. Thus, studies highlight that the major roadblock in successful implementation of lean manufacturing that lead to improvement in production effectiveness is the hesitation of management to empower employees. Ahuja and Khamba studies also share the same viewpoint that the rigid bureaucratic structures of the organizations are impeding empowerment of the employees. Lack of employee involvement in the overall implementation can lead either to their failure or partial implementation of these systems. Based on the above discussion, the following arguments has been formulated [7].

Unsuccessful implementation of lean manufacturing techniques is caused by employees' reluctance, lack of training and ethical education, and lack of follow up by the officials in the organization [8]. The purpose behind training and retraining of employees is to develop multi skills that could help them work more diligently, enthusiastically, independently and responsibly [9].

It is important to identify the causes for failure and understand their reasons and implications to assure a minimum probability of success in subsequent ventures with Lean [10]. The barriers to lean implementation can be grouped into the following ten broad areas by characteristics: organizational culture, knowledge, management, conflict, resources, technology, finance, employees, customers, and past experience [11]. Most of the occasions, a failure in Lean implementation is being attributed to lack of knowledge in lean, impatience and ignorance of the benefits being reaped by a cross section of companies leading jeopardizing the implementation at different stages. Isolated implementations as well cannot bring sustainable developments in performance even if the method is Lean [12]. Using the know-how on Lean in appropriate circumstances in applicable industries will reap better rewards than a mass application [13].

3. Research methodology

Case research is particularly valuable when the intention is to examine phenomena in their natural setting. In addition, according to Rivera and Chen studies [14], case studies are appropriate when the research seeks to address "how" and "why" questions. The type of case research employed in this study is a retrospective case study of ten companies. This research perspective enables a thorough, in-depth analysis of the various aspects involved in the adoption of Lean strategy, by examining retrospective views of an unsuccessful attempt to implement Lean strategy. A major benefit of a retrospective approach is the reliability of the case's selection, since the sustainability, of strategy implementation can only be evaluated in retrospect [15]. Inaccuracies in artifacts, interpretation and perceptions, priorities, and objectives are influencers in this method.

Author was either a listener or observer in the process of understanding lean thinking perspective and implementation styles across various organizations. While conducting multiple case studies, benchmarking of cases with theory and inter cases comparisons were conducted to understand the environmental differences. According to the multiple case study method evaluated, the sufficient number of the cases required for this study is envisaged as 10 Lean failures. To assess the companies approaches and results of lean implementation; data collection step was performed. The types of data collected were selections, narrations and visual experience.

Assessment of the companies consisted of three main parts: assessment of lean adoption steps, perceived performance of proposed processes and actual results of those processes in reality; and degree of Lean implementation and institutionalization.

Lean adoption was evaluated based on the status of defined protocol that also includes work environment, management, performance analytics, competency, work force morale, risk and continuity, and change handling aspects as well, as its effectiveness and efficiency indicators of maturity, and finally practice evidence. Perceived performance of process is evaluated by the estimation methodology defined, and its application evidences. Actual results are the observed values and its practice evidence in the form of data collection formats and associated practices. Degree of implementation and institutionalization maturity was assessed based on the simplified model [16]. According to this simplified model, nine criteria of lean implementation maturity are assessed: elimination of waste, continuous improvement, zero defects, just-in-time deliveries, pull-of-raw materials, multifunctional teams, decentralization, integration of functions, and vertical information systems. Each criterion has determinants. Determinants describe the results of implementation of corresponding criterion. Determinants are assessed with explicit rules of coding such as, 2 for well implemented, 1 for fairly implemented and 0 for poorly implemented. Those grades are brought in by author. Such grades are chosen from simplicity point of view and only with the aim of classifying content based on the degree of existence or a peculiarity of a particular characteristic in data. Assessment is made by comparing the initial state before lean initiative started and the state of each area by the time of assessment. Similarly, specific to the assessment of lean implementation results; determinants were summarized, and qualitatively compared and quantitative translation and summarization was avoided to prevent this paper from drifting towards a biased conclusion, rather messages must be presented to further the possibilities of a balanced quantitative research.

Collected and classified qualitative content in the form of text, narrative and visuals were analyzed by using content analysis method. Content analysis method could incorporate the various kinds of analysis where communication content

is categorized and further classified and is a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding. Data analysis in current paper used the coding approach after following some preliminary examination of the data: material is reviewed and a set of features in the form of checklist is created, further applied for coding. As such, validation of the inferences made on the basis of data from one analytic approach demands the use of multiple sources of information. Meaning, the researcher should try to have some sort of validation study built into the design, for example in the form of triangulation, which is often used in qualitative research. By triangulation the credibility of the findings could be achieved by incorporating multiple sources of data. In current research three main types of data were used. Based on the content analysis method, the data was naturally categorized based on criteria from Karlsson and Ahlstrom (1996) model. Next, data were analyzed and concentrate of needed information were brought out based on data type – text (company documents), narrative (questionnaire and interviews) and visual (photos, video and field notes). Further, summarizations were given to each determinant based on data available.

The summarized qualitative information is compartmentalized into twelve themes that forms the twelve Lean arguments, around which an argumentative approach was facilitated. In this approach, the well promoted stand on Lean is exposed based on the content analysis inferences.

4. Arguments and discussion

Argument 1: A method of success-by-design.

Lean promotes the advantages of developing quality, productivity, reduced inventory, flat structures, teaming and flexibility [17]. Main principles of Lean: specify value from the standpoint of the customer, identify all the steps in the value stream and relentlessly work towards eliminating steps that do not create value, make the steps flow smoothly towards the customer, let customers pull value from the next upstream activity and begin the process again until a state of perfection is reached. Lean in the absence of a repeatable and reproducible methodology in reality is a method of success-by-chance with tools and techniques. Lean does not believe in investing in elaborate designs of experiments or benchmarking due to the absence of standard methodology and measurements.

Lean promotes an organizational transformational context; therefore size, age, complexity, infrastructure and competency create the essential environment that decides the strategy of the endeavor. Then the change management determines the success of the initiative as it is bestowed with the charge of change over, risk control, sustenance, disaster recovery and business continuity while transforming the situation [18]. Thus, observations favor the counter argument, that Lean is a method that provides success-by-chance.

Argument 2: A method that favors industrial relations.

Teaming for the enterprise is different from democratic industrial relations. Lean teams are with limited objective and scope of operation. The teaming process in Lean revolves around, a process or a machine or an area of the production floor. The competency required to be part of the team is limited to lean tools. Thus, Lean rhetoric is countered in this argumentation with a selected scope and interpretation.

Argument 3: A method aligned to economics.

In Neo-liberalized and capitalist economy, continuous improvement through waste elimination to eventually generate value is not a choice. Classic example is the growth of IT industry in the developing countries on the cusp of maintenance,

enhancement and support projects of many softwares that were developed earlier. Thus, at times, waste itself creates an industry, then that waste becomes value adding waste. Any resource that does not generate value to customer is eligible to be called a waste [19] is not a sustainable argument as for one service provider, an effort that could be termed as waste may eventually create a new business line, more employment and an expansion in the purchasing power of society. Thus, Lean need not find a complete alignment with social economics.

Surveys claim, lion-share of lean initiatives fail to achieve systematic productivity improvement and even suspects the benefits claimed in many of such initiatives [20]. Popular as a management system and has become a style symbol of operations, as part of leaning operations may save for the organization, but reduction in manpower and remuneration restructuring to the lower side associated with such initiatives impacts the purchasing power of the society. This indirectly points to disparate definitions and perceptions in interpreting the claims.

Free-market economies propounding laissez-faire economics that allows a free hand to the business to devise norms to conquer market with ruthless competitiveness and reduced subsidies for the sake of survival was forced to shed virulent trade union intransigence leading to a social and political transformation. It is essential to investigate the role of Lean methodology in promoting unemployment in many industrial belts. Unchecked capitalism and globalization have taken away pluralism in management and turned focus to discover value for the customer as an outcome of value chain. This is possible only by increasing productivity at lower costs, so internally, the focus is still not on customer but on production systems. If value and loyalty are perceived in faith, the politics in displayed improvements comes obvious.

Argument 4: A method that sustains benefit.

The repeatability and reproducibility of the results associated with Lean initiatives are invariably absent in the survey. It also could be due to absence of a structured methodology, accepted glossary of terminologies and availability of verifiable results. Thus, absence of a standardized scientific method creates a void while treating lean as a system to enhance business practice rather than industry sectoral differences.

The experiences from Toyota Production System of 1970s formed the basis of western attempts to build a corpus of derived knowledge out of it to create a book of knowledge on Lean [21]. The whole objective of Womack et.al [22, 23] in 1990s was to create a theoretical basis applicable irrespective of industry to gain advantages that are agreeable irrespective of the verifier. The hypocritical bias and judgmental attitude took a backseat as soon as Lean terminology emerged out of International Motor Vehicle Program. Eventually, five principles that laid the foundation of Lean emerged and they were concept of value, value stream mapping, perfecting the ideology of pull the flow. Then it was a time for a plethora of techniques to evolve along with contexts for their application.

Lean is industry independent, while its roots may be in production, and it is prevalent in services as well. Lack of empirical rigor is an established issue in Lean and even research papers are analytically inadequate as most authors prefers to discuss around an event, experiences or an implementation and rarely it gets into compare and contrast analysis of a cluster of failed case or case surveys to reveal the differences, factors involved, extent of success that can be attributable to plans, implementation models, and actions. Even qualitative analysis when it is contextual it generates arguments, possibilities, hypothesis which could eventually be tested to identify the effectiveness of the Lean effort, which rarely happens [24]. While lean remains as a collection of techniques, their relative importance and effectiveness and efficiency of performance are yet to be quantitatively evaluated to structure

it into a framework or lifecycle to give universal acceptability, thus its ability to provide a sustained benefit cannot be proved beyond doubt.

Argument 5: A method that sustains business.

Radnor and Johnston studies [25] is of the view that lean transformation mainly motivated by the cost reduction associated with it rather than the customer value it can bring. But at times waste also sustains business as is the case with certain failures create a demand to do the right for the customer which becomes the subsequent version that would sustain the life cycle of a product in the market and the antithesis is it is the consequence of a poor service design. So then what is a leaning operation and how to perform a lean service. Unless there is a clarity, a framework, and process and tools to support it and metrics to measure, the claims will become redundant. Else, adopting and adapting techniques that showed result elsewhere when planted in a different environment and in different context, need not realize the same outcome. In other words, techniques that provided benefits in a industry under specific conditions need not reward the same way, and it may even import unwanted effects [26].

How much pull effect can reverse low demand in a production environment? Pull effect is on the basis of creating a product that generates a desire in a customer which translates to a product demand. Demand is not merely based on features, but also determined by affordability, necessity, substitute and uniqueness that together generates the value the product generates in the market. Lean is not a product innovation methodology, rather it always remains as method to optimize cost. Unless cost is balanced with features and ego satisfiers, the product will meet with the history of Nano car in India. Hence, lean is never a guarantee for a product to be a success in the market.

Argument 6: A methods that is universally applicable.

Lean, because of its origin in manufacturing may have all the wastes defined with a manufacturing perspective, then a direct correspondence in services is difficult to find. For example, a defect in a tangible product and a defect in service is totally disparate. Similarly, the context determines the definition of defect, for example, an excess inventory in manufacturing stock foretells possible wastage, but at the same time a shortage in inventory need not be ideal too as it may create opportunity cost in services and may be appreciated as JIT in manufacturing [27]. So universality of the concept is at the goal level that is, generate value by reducing waste rather than debating at applicability of the definition of the type of waste in different industries and sectors, moreover, in service value is co-created while in manufacturing producer creates and recipient perceives. This becomes clear when it is translated to monitory values where post-service revenue is based on conditions created by customer and hence lack definiteness, but a tangible product revenue is definite and earned as soon as it is sold. This brings the curtain down over multi-sectoral comparability. Even in strategy, a pull method is a possibility in manufacturing but the same cannot be expected in services as arrival rate and pattern in services is a matter of probability.

In all safety critical industries such as health, aeronautics, nuclear energy, oil and natural gas etc., active Lean employment on that system is not advisable. The situation is identical in every production space where there is a statutory and regulatory compliance involved. But any other Lean efforts performed in other departments, if it reduces environmental impact score, then that will be considered as a financial incentive generated out of resource conservation and pollution reduction. Thus, there are scenarios where Lean is not likely to be the drug-of-choice.

Argument 7: A method neutral to production peculiarities.

While Six Sigma strives for near perfection, Lean tries to accelerate the velocity of the end-to-end process by reducing the Lead Time. But consistency in achieving

near perfection at high productivity rates is not mere LSS achievement. Lean promotes the idea of high rate of production in small batches is under the assumption of Overall Equipment Effectiveness and maintaining constancy of quality is never a guarantee.

In those industries where bulk production is not possible, Lean faces limitations. In case of multi service counters, made-to-order large engineering goods, where demands are unique for every customer. Under such conditions, attempting Lean at higher levels where commonality can be perceived is tried as an option, but farther in the value chain when optimization strategies are attempted, the real value perceived at the recipient end is limited.

Then the methodology claims to have the ability to maximize shareholder value by consistently improving Quality, Cost and Customer Satisfaction. Absence of credible quantitative data to evaluate and benchmark performance of lean projects is unavailable is a major constraint. If it has to be proved that it is the methodology that makes difference, it is equally significant to nullify the effects of factors such as industry, culture, competency, production volume, process, technology, material involvement etc. The performance that are pertinent are, but not limited to the following areas such as lead time, waste management, labor productivity, and economic value add synergistically. Is yet to be ascertained consistency in performance, causality for variability etc. Thus nature of product and volume could be critical determinants while deciding on Lean as the method for process improvement.

Argument 8: A method in itself is a strategy and enhances creativity.

While subjectivity, scale and understanding affects the measurement system error; an authentic survey analytics to agree on source or type or excellence-based clusters formed by practices, techniques, and tools is still not available. Principal Component Analysis with Varimax rotation will generate principal component with high factor loadings to identify a theme associated with it that significantly influences the success of a Lean initiative. Does Lean promote innovation? Role of lean in creativity through product designs and functionality is a questionable character, hence its strategic role is of limited extent. Success of a operational strategy must be linked to performance parameters such as quality, cost, rate of flow, safety, and innovation. If Lean has to qualify itself as a strategy, then it needs to perform on all such parameters to stay in isolation as a independent methodology [28].

Argument 9: A method with many techniques as strength.

In lean, plenty is the problem when it comes to techniques. Then, appropriateness in choice and correctness in application determines fate of the problem. Deciding on which of the many lean tools to apply, where and when and how it is applied create the inevitable inconsistency in methodology. This also highlights the critical constraint when it comes to benchmarking of practices and outcomes, as it has become relative.

Similarly, situation or tool finds prominence in the whole episode matters, but the methodology must not lean on the effectiveness of a technique rather on the appropriateness of the protocol and efficiency of its implementation. Therefore, there has to be a clarity in approach that will stabilize, steer, and succeed in achieving objective. Waste reduction is not an assurance on cost of quality nor productivity will decrease and gross profit will rise which will take the excellence professional to stardom [14]. A naïve implementation of Lean is a demonstration of few techniques and tools with absolute disregard to the problem at hand and waiting for a magical improvement to follow.

Lean is tightly coupled with production planning and control system; therefore, a naïve implementation will make inadequate changes in isolated regions that will not be sufficient to create an impact on the ecosystem and thus, the objective of organizational transformation will hit a logjam. Therefore, in a haste such a lean

approach bend on tools that fails to collectively build on benefits and cover the optimization of the entire system leading to an incomplete appreciation of the role of leadership for organizational development. Then, such a Lean approach end up as a mean-based approach that cannot assure enduring benefits.

Argument 10: A method that creates a culture.

If Lean is a culture, then the cultural elements must be transient in the society and political forces must support it, then only a change management leadership that fosters the outcome can survive. The methodology, techniques, people empowerment, human relations, communication must work synergistically to create a milieu where continuous transformation as a culture thrives. Neglecting role of consensus and collaboration that forms the bedrock of human relations will jeopardize the outcome of the strategy [29]. Situational relevance and deliberate temporal progression as critical variables; with choice of tools and risk management as residuals determines the fate of the Lean implementation strategy. Only a learning organization from its mistakes, culturally tuned for waste elimination, and iterative implementation alone can churn value out of a system. Lean fails to have a phase and an analytical schema to connect factors such as intuitiveness, perception, judging etc. as human factors that contributes to errors, thus creating process prisoners created by our espoused past. In the effort to dehumanize processes, are they not antithetical to the claims on human resources competency and conveniently being sidelined in Lean when it comes to defects management? While people are not monitored, the people scrupulously monitor process with stopwatches and the numbers are only seen from the point of process disorders while process masters might leave unscathed. By any chance, if numbers are looked from a people angle, then it is invariably will find an overarching reason to settle scores and materialize individual agenda. Have that not made Lean a methodology averse to radical innovations? This is in addition to the failure mode created by the inadequate implementation of a successful strategy. By not having a Lean hierarchy to drive initiatives, the first among equals norm sets in, then it becomes persuasiveness of the phrases, placards and parades unleashed by power brokers in enterprises that determines the effectiveness of a methodology rather than the value it actually generated.

Argument 11: A method that makes difference by setting house in order.

When problem lies outside the production house, then how best a leaning drive inside the house bring betterment to overall process. For example, congested roads and supply ecosystem widely distributed, and their supply chains are not optimized will bring more anonymity and failures in the JIT process. The extended gap between Lean intervention storms also added to reasons to lose momentum and motivation.

Argument 12: A method with a human centric face.

The role and competency of Lean management leadership many times by the nature and style of intervention, and by the demands set on employees (long working hours, denial of leave, lack of support for their suggestions, ad-hoc project management, no lead-by-example, only demands) has only created unhappiness and loss of confidence. In an effort to build speed, management fails to realize that the same thrilling speed can even kill the quality and creativity in business. To support the rush, specialization becomes a must that takes away the variety and boredom sets in.

In a hurry to crunch the unproductive training time, create parallel training tracks but that denied integrated competencies and holistic visibility. Limiting the training to senior and middle segments of organizational hierarchy, companies make the mistake of leaving the larger section of the workers on the floor guessing on the developments and builds anxiety. The behavioral changes from anxiety to discontentment to rebellion is not a long way which will manifest as loss in

productivity and quality which will defeat any process improvement irrespective of however better it may be.

Laxity in leadership commitment and failures in creating breakthrough in culture change management leads to failure of Lean management. Minor glitches during test and transition phase of any Lean life cycle, if it rakes up restlessness in leadership leading to issuing discomforting communications, adds fuel to failure. The cumulative effect is loss in trust and respect to the management. Eventual Robotic Process Automation decisions will lead to elimination of manpower and even necessity for further lean intervention. Why there was no analysis on the failure in responsibility and accountability of senior management in ensuring the culture change? Where lies the human centricity?

5. Outcome as recommendations -6Cs

5.1 Command

Lean cockpit must be responsible for selection and approval of Lean initiatives are as well considered as projects for an organization. Unless the definition and disciplines of the project are not mandated, these improvement initiatives will go never ending. Lean is a strategic service provided by the corporate improvement groups. Therefore, it is imperative that there must be a protocol for driving a Lean intervention and solution selection, and a structured approach to choosing the project. The project must have a scientifically estimated quantitative business impact upon which outcome of the project may be evaluated. The projects must cover process and product performance parameters independently. The project must cover processes for development and support of the products. Projects must ensure the products and processes are improved and innovated with Lean implementation. The collective nature of achievement of a business objective must be mapped and drafted as part of charter, then project specific expected contribution must be defined. A collective projects catalog may be transformed into a monitoring dashboard. Milestone based verification and validation needs to be performed to control execution of Lean drive.

5.2 Control

Leaning operation involves a thorough change management. Then a guarded approach to the culture change implementation is necessary. A change approval board must intervene to verify and validate proposed new working model, this is necessary for wider acceptability as is takes the ownership from a lean Leader to an institutionalized arrangement. Prior to change adoption, configuration management audit must be performed to ensure continuity, integrity, safety and security of the business. Any setback in the process of the Lean initiative must be recorded as a leaning incident and a cause and consequence assessment needs to be performed before fixing.

5.3 Culture and competency

Lean is ultimately a culture change promoted by people, process and technology. Out of which people forms the most critical link that determines the make or break of this initiative. It is the insecurity feeling that originates from fear of job loss, redundancy, anxiety over inability to perform in changed circumstances breeds collective objection that ends in obstruction of the change. But the whole series of

fear psychosis is rooted in concerns around the incompetency factor. Therefore, creating the right milieu is essential as part of planning an enterprise wide Lean initiative. A thorough competency analysis that ends in a competency development plan is a must that takes care of the career aspirations and employability of the affected population, thus transforming them as Lean promoters. The learning and development imparted to the pioneer group may be systematically percolated to lower layers to enable organization wide understanding that takes away shocks and surprises.

5.4 Cause and consequence

A proactive extended Failure Modes and Effects Analysis that maps potential failures to their possible consequences. A systematic assessment of systemic failures in Lean is essential to ensure erosion is value is prevented and savings to be sustained. The major sources of failures observed in this study are management, competency, communication, leadership, teaming, performance measurement, suppliers. Every source has their own set of categories of failures. Management with their lackadaisical attitude, uncommitted sponsorship, under budgeting resources, and ill-informed as major categories contribute to failure. Under competency identifies, inadequate and ineffective learning and development programs in lean have been contributing to failures. Communication as another source of failure identifies weak and limited broadcast that lacks conviction. The leadership quality as a source is another concern, when process identification, project identification, ensuring cooperation and breakthroughs are identified as categories of failure. Teaming is another source of worry, when team displays disloyalty, non-committal, under involved, uncertain, incompetence as categories of failures. Performance of a project is another source of worry as data, measurement, analysis, reporting, action orientation are categories of concern. Suppliers are another significant source of failure, as categories such as poor-quality supplies, and delayed supplies are major categories that attribute to Lean initiative failures. All the categories may be subjected to intense independent Root-Cause Analysis from all the 7 M dimensions such as man, money, material, method, machine, measurements and milieu can reveal the ultimate root causes which when acted upon will help in arresting repeat failures. Collective analysis of these root causes enables organizations to plan preventive actions against potential failures.

5.5 Communication

Uniform understanding of the objective and approach among stakeholders is essential to get the buy-in from the enterprise to succeed in Lean initiative. The program charter, risk and repercussion analysis, performance measurement analytics are key information that needs messaging. External suppliers are critical stakeholders as any service quality parameter slippage may adversely impact the overall performance of the process despite rigorous leaning efforts internally.

5.6 Convergence

Convergence of purpose is essential to find business impact. Convergence of plan is essential to find focus of all values derived to a financial benefit. Convergence of skills, knowledge, abilities, aptitude and attitude is essential to translate the gains to tangible outcomes and sustain the same. This convergence can become a reality, if and only if, labor feels stabilized and confident. The work force must feel owned by the corporate, then they will own the transformation agenda.

6. Concluding thoughts

Organizations across globe in pursuit of competitive advantage has a history of having implemented a variety of policies and strategies to gain competitive advantage. However, all such attempts are not accompanied by successes, rather many face obstacles and failures in the implementation of these programs. Organizations invariably turn the blame on to staff commitment and performance. Confirming the same as applicable to successful implementation of lean programs and achieving the benefits depends on the quality, preparedness and readiness of the human capital. Therefore, the organizations should know, the men behind the machines. If employees are not adequately taken into confidence in the implementation of lean programs, the benefits will not accrue. This is because, mostly imperfections marred implementations in supplier ecosystem.

Recent years when there is a global rise in evangelism over lean with coherent and persuasive arguments, there are a very few self-conscious attempts to critique this methodology from academic community. The criticisms are never an assurance of value when adequately considered during lean implementation but if not done, then research community fails in its fundamental responsibility to ensure subjugation of philosophy to insidious academic scrutiny to loosen the grip of vested interests on a management dogma and subsequently bring down totalitarianism. Else, blind following of assurances of wizardry by a technique will reap disappointing performances forcing the gullible professionals taking cover behind another hype and move with the tide, but failure modes never comes obvious for an open debate. Choice of blending a cocktail of tools is part of building technical rationality, but if it disempowers the human factor, then it brings a crisis. Failure of Just-in-time, absence of safety stock, and field defects creates an opportunity cost attributable to the methodology. In the aggression to remain lean, even CSR and employee welfare spending may get treated as non-value adding. Management experimentations thrive where collective deliberations are minimally promoted, which means, democratic values in industrial relations are not of prime importance, rather it means trade unionism must fail. The fundamental axioms of enterprise unions such as healthy, safe, fearless, work environment that assures indiscriminate treatment and respects individuality of thoughts and deeds; and people are permanent assets are destined to remain in chapters. Constancy of workforce is a wild assumption in Lean.

By performing current research author has proved that if arguments mentioned above are taken into consideration and are actually managed then companies has all prerequisites to achieve its desired targets in terms of lean – meaning successful lean implementation. At last, creation of the lean as a value system is central part of the model; it drives all other steps and thus is main critical success factor for the successful lean thinking implementation. Thus, the initial proposal is true – on of the reasons of failure of lean thinking implementation process is absence of company's vision of its lean initiative in the form of lean strategy as a form of their unique lean value system.

The findings of this study are only the tip of the iceberg. There are a lot of questions which should be answered in this area. Even while failures are rampant, still corporate herd around Lean, what all could be the driving factors? How to study a Production System? Are these philosophies still relevant today in the times of robotic automation? Are there other ways to study lean system without visiting a site what will be the output of such a travel?

Another question which might arise is how to create own lean value system representation – where and how to start. And there are more such questions. To answer all of them the ultimate goal has to be achieved – Development of the

curated model of successful lean implementation. This model should incorporate Process, People and technology aspects for all manufacturing process types facilitating assessment of the financial feasibility of implementation as well. Ultimately, the transformation must lead to lean capital needs and generous labor needs to assure and ensure an all inclusive social economic growth, which is part of corporate social responsibility which every corporate strategy has to support.

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References

[1] Nachiappan, R., and N. Anantharaman, 2006, "Evaluation of overall line effectiveness (OLE) in a continuous product line manufacturing system", Journal of Manufacturing Technology Management, Vol.17(7), pp.987-1008

[2] Bayat, H., and M. Dadashzadeh, 2017, "The impact of organizational factors on implementation outcomes of lean manufacturing", Journal of Business and Economics Research, Vol.15(2), pp.33-44.

[3] Worley, J. M. and T. L Doolen, 2006, "The role of communication and management support in a lean manufacturing implementation", Management Decision, Vol.44(2), pp. 228-245.

[4] Abdulmalek, F. A., and J. Rajgopal, 2007, "Analyzing the benefits of lean manufacturing and value stream mapping via simulation: A process sector case study", International Journal of Production Economics, Vol.107(1), pp.223-236.

[5] Jadhav, R.J., S. S Mantha, and B.S Rane, 2014, "Exploring barriers in lean implementation", International Journal of Lean Six Sigma, Vol.5 (2), pp. 122-148.

[6] Poksinska, B.,2010, "The current state of Lean implementation in health care: Literature review", Quality Management in Healthcare, Vol.19(4), pp.319-329

[7] Ahuja, I., and J. Khamba, 2008, "Strategies and success factors for overcoming challenges in TPM implementation in Indian manufacturing industry", Journal of Quality in Maintenance Engineering, Vol.14(2), pp.123-147.

[8] McKone, K. E., R.G. Schroeder, and K.O. Cua, 2001, "The impact of total productive maintenance practices on manufacturing performance", Journal of Operations Management, Vol.19(1), pp.39-58.

[9] Propate, R. V., S. R Jachak, and P.A Hatwalne, 2011, "Implementing approach of total productive maintenance in Indian industries & theoretical aspect: An overview", International Journal of Advanced Engineering Sciences and Technologies, Vol.6(2), pp.270-276

[10] Lodgaard, E., J. A. Ingvaldsen, S. Aschehoug, and I. Gamme, 2016, "Barriers to continuous improvement: perceptions of top managers, middle managers and workers", Procedia CIRP, Vol 41, pp. 1119-1124

[11] Zhang, L., B.E Narkhede, and A.P Chaple, 2017, "Evaluating lean manufacturing barriers: an interpretive process", Journal of Manufacturing Technology Management, Vol. 28(8), pp.1086-1114

[12] Bhasin, S.,2012, "An appropriate change strategy for lean success", Management Decision, Vol. 50 (3), pp. 439-458.

[13] Staudacher, A.P., and M. Tantardini, 2008, "Lean production implementation: a survey in Italy", Dirección y Organización, Vol.35, pp. 52-60.

[14] Rivera, L. and F. F.Chen, 2007, "Measuring the impact of Lean tools on the cost-time investment of a product using cost-time profiles", Robotics and Computer-Integrated Manufacturing, Vol.23(6), pp. 684-689

[15] Voss, C., and N. Tsikriktsis, et al., 2002, "Case research in operations management", International Journal of Operations and Production Management, Vol.22(2), pp.195-219.

[16] Karlsson C. and Åhlström P. , 1996, "Assessing changes towards lean production", *International Journal of Operations and Production Management*, Vol. 16(2), pp. 24-41

[17] Stone, K.B., 2012, "Four decades of lean: Systematic literature review", International Journal of Lean Six Sigma, Vol.3(2), pp.112-132

[18] Kotter, J. P., 2007, "Leading change: why transformation efforts fail", Harvard Business Review, Vol. 85(1), pp. 96-103.

[19] Arfmann, D and F.G.T Barbe, 2014, The Value of Lean in the Service Sector: A Critique of Theory & Practice, International Journal of Business and Social Science, Vol. 5(2), pp.1-7

[20] Pearce, A., and D. Pons, 2019, "Advancing lean management: The missing quantitative approach", Operations Research Perspectives, Vol.6 (C), pp.1-14

[21] Holweg, M., 2007, "The genealogy of lean production", Journal of Operations Management, Vol. 25(2), pp. 420-437

[22] Womack, J.P, and D. T Jones, 1997, "Lean thinking, banish waste and create wealth in your corporation", Journal of the Operational Research Society, Vol. 48(11), pp.1148

[23] Womack, J.P., D. T Jones, and R. Daniel, 1991, *The Machine That Changed the World : The Story of Lean Production*, Harper Perennial, ISBN 978-0060974176

[24] Pakdil F., and K.M Leonard, 2017, "Implementing and sustaining lean processes: the dilemma of societal culture effects", International Journal Production Research, Vol.55, pp.700-717

[25] Radnor, Z. and Johnston, R. (2013). Lean in UK Government: internal efficiency or customer service? , *Production Planning and Control*, Vol:24(10/11), pp. 903-915

[26] Teehan, R. and W. Tucker, 2010, "A simplified lean method to capture customer voice", International Journal of Quality and Service Sciences, Vol. 2(2), pp.175

[27] Bowen, D. E. and W. E. Youngdahl, 1998, "Lean" service: in defense of a production-line approach", International Journal of Service Industry Management, Vol.9(3), pp.207

[28] Fukuzawa, M., 2019, "Critique on the Lean Production System Research", Annals of Business Administrative Science, Vol. 18, pp. 85-101

[29] Hendry, C., 1996, "Understanding and creating whole organizational change through learning theory", Human Relations, Vol. 49(5), pp. 621-641.