A Survey Of Lean Implementation Gap Analysis In Public Sector Organizations

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ABSTRACT: This paper is an endeavor to highlight/identify the areas of improvement in the production systems of typical public sector organizations in view of the implementation of Lean Manufacturing practices to improve Competitiveness. To serve the purpose, a survey has been conducted to get the consensus of managers belonging to various tiers of management of these organizations through responding to a questionnaire. This questionnaire, based on the importance of various features of Lean Manufacturing and their actual effective implementation in respective organizations, has been used to collect the data from which certain results have been inferred. The research signifies the fact that, although most of these public sector organizations enjoy the status of holding ISO Certified Quality Management System Standards, still there exists a capacity for Business Process Improvement in their production systems owing to various Lean Implementation Gaps and lapses. This can ultimately prove complementary to the policy of Continuous Quality Improvement and other principles of Quality Management System Standard.
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1. INTRODUCTION

Public sector organizations operate under resource constrained and less organizational, technological and managerial proficient environment (Thong et al., 2000) as compared to their private sector counterparts. Moreover, public sector organizations have a hierarchical-command structure which is relatively more rigid (Gullege and Sommer, 2002), and a culture that places less emphasis on customer focus or alignment of business processes with customer expectations (Zaheer and Mushtaq, 2008). This study is an effort to bring into light the fact that in most of the public sector organizations, even if they claim to be registered with the prestigious ISO Quality Management System (QMS) Standards, still there is enough room to impart Lean Manufacturing Practices in the system to actually help and complement the QMS in vogue.

According to Robitaille (2004), in truth, good lean practices complement a QMS, as efficient, well-implemented supplier monitoring programs, for example, might initially incur costs but will ultimately reap benefits from more consistent and reliable vendor performance. This, in turn, results in fewer returns, fewer costly interruptions to production schedules and a decreased risk of defects reaching customers. Nevertheless, in public sector organizations, owing to the inefficiencies of performance in terms of poor quality, time and money wastages, inordinate delays, cumbersome channels and financial mismanagement (Zaheer and Mushtaq, 2008), there is an overwhelming chance that several important areas of production may certainly be overlooked with a point of view of Lean Standards. In fact, Hammer and Champy (1993) relate the fundamental rethinking and radical redesign of business processes to achieve Dramatic improvements with critical, contemporary measures of performance, such as Cost, Quality, Service, and Speed. At the same time, as emphasized by Donovan (2011) the superior Competitive Performance demands a holistic view based on broader perspective of the business to deal with poor delivery performance, long lead times, higher costs, lower market shares, and ever declining sales volumes.

All these facts signify a need to eliminate the non-value-added activities and waste generated in the existing production system by identifying the areas to be subjected to constant monitoring and improvisation in order to achieve superior competitive performance. For this purpose, a survey has been conducted by designing a questionnaire addressing some of the cardinal areas of Lean Manufacturing with representative questions, and collecting the opinion of the managers from different tiers of at least 10 diverse public sector organizations. The survey is a useful means to reveal the gap between the importance of a certain feature of Lean Manufacturing (in terms of their contribution to superior competitive performance) and their actual implementation status on ground. The outcome of this survey is a direct assessment of the status of organization that how Lean its existing business processes are, and to elucidate the

especial areas of consideration to be subjected to rigorous Business Process Improvement.

2. LITERATURE REVIEW

2.1. Definition of Lean:

Lean Manufacturing, while known by many names, allows manufacturers to be fast and nimble enough to quickly react to changes in customer demand and perform it with little inventory (Donovan, 2011). Public sector or private Sector, organizations are now more and more conscious of piling up of inventories on shop floor in the shape of raw materials, work-in-process inventory and over-production, considering it a hindrance to the smooth and streamlined flow of production.

Lean is an American term created to define the application of some techniques derived from a study of the Toyota Production System. In essence, each activity is examined to identify and eliminate those wasteful activities that are not adding value. In addition, some activities may be combined or rearranged to make the flow more efficient. Increasingly, Lean practitioners are also creating value stream models that represent the flow of activities from the customer's order to delivery (Harmon, 2011). Lean manufacturing is a generic process management philosophy, whose principles are pull processing, perfect first-time quality, waste minimization, continuous improvement, flexibility, building and maintaining a long term relationship with suppliers, autonomation, load leveling and production flow and visual control (Executive Development Ltd, 2007)

Generally, 'Lean' is considered to be the newest trend in vogue mainly related to cost-reduction through elimination of non-value-added activities and is equally applicable to manufacturing setups, projects and proposals. Though facing sort of cynicism related to its implementation problems, certain high-profile high-success executions under the auspices of Toyota has made it quite attractive in the eyes of a considerable number of business owners.

Overall, 'Lean' is understood as a means of elimination of waste, quality improvement, and production cost and time reduction. The other acknowledged aspect of this phenomenon is production flow improvement or smoothness of work through production line balancing. An initiative for smooth production flow automatically exposes quality problems and culminates into waste reduction. Lean implementation is therefore focused on getting the right things, to the right place, at the right time, in the right quantity to achieve perfect work flow while minimizing waste and being flexible and able to change (Executive Development Ltd, 2007). All efforts in 'Lean Manufacturing' focus on making things simple to apprehend, and become doable and manageable.

2.2. Background and History:

Frank Gilbreth, the motion efficiency expert, is the pioneer in identifying the concept of waste being built into jobs and then taken for granted. Frederick Winslow Taylor, the father of scientific management, established the phenomena of standardization and best practice deployment. In his famous book, 'Principles of Scientific Management' (1911), he elaborates the notion as "And whenever a workman proposes an improvement, it should be the policy of the management to make a careful analysis of the new method, and if necessary conduct a series of experiments to determine accurately the relative merit of the new suggestion and of the old standard. And whenever the new method is found to be markedly superior to the old, it should be adopted as the standard for the whole establishment".

The advent of industrial revolution a century ago replaced craft production with mass production. Henry Ford is considered to be the manufacturing's original 'Lean' thinker. Ford (My Life and Work, 1922), propounded a description that covered the entire concept of waste. Ford's continuous flow method proved highly effective in production of a single, repetitive item. With increase in diversity of demand, the concept loosened its relevance. The history marks the point as the induction of larger machines, particularly in North America, where larger batches of product were preferred to be manufactured. In contrast, Japanese producer Toyota was developing a paradigm supporting smaller batch production and just-in-time delivery i.e. producing only necessary units in necessary quantities at precisely the right time (Kinaxis Corp, 2011), and hence reduction in inventory and product cost with increase in productivity. The concept of 'Lean' stemmed from the business environment reigning the Post War economy of Japan. It occurred to Taiichi Ohno while visiting the US supermarkets that scheduling of work must be driven by actual sales rather than by production or sales targets.

2.3. Characteristics of public sector organizations

Johnson et al, (2005) have highlighted the role of public sector organizations in contrast with the private sector as engaged with multiple objectives and limitations regarding their ability to generate new revenue, with ultimate control over their existence held by publicly elected bodies. Kay (1995) further elaborates this aspect as for public sector organization, the added value or benefits are not retained by the firm, but instead are distributed to its member or the community. This presents the paradox of creating

knowledge and services and let them pass to the public for their good instead of maximizing private profit. McAdam and Donaghy, (1999) discuss the specific characteristics of public sector organizations as:

- Rigid hierarchies.
- Culture and values promoting continuity, predictability, and fairness instead of change and innovation.
- Multiple stakeholders for many processes – boundaries cannot be crossed, stakeholders and processes often extend beyond the boundaries of a department or agency.
- Sudden and dramatic changes in policy possible.
- Overlap of initiatives.
- Broader scope of activities – unrealistic expectations.

2.4. 'Lean' as a Requirement

Today, Lean supply chain performance must become the goal of every manufacturer. Creating the Lean supply chain by streamlining business and production processes to significantly reduce cycle time, decrease inventories, lower costs and increase customer service has become the mandate for survival (Donovan, 2011). Lean manufacturing imply identifying and eliminating non-value-adding activities in design, production, supply chain management, and order processing by analyzing the existing value stream and developing a Future State Implementation Plan. The idea of lean is founded on the following principles (Kinaxis Corp, 2011):

- Define and pursue what is value in the eyes of the customer
- Thorough analysis and identification of the value stream and eliminate waste
- Value flow driven by the pull of the market demand
- Participation and empowerment of employees
- Continuously improve in pursuit of perfection

2.5. Types of 'Wastes'

The 'Lean' considers every such activity a waste that is non-value-added, hindering the process flow due to unevenness or causing overburden to the production system. The various writers and experts [(Donovan, 2011); (Harmon, 2011); (Executive Development Ltd, 2007); (Kinaxis Corp, 2011)] identify the following activities as deadly wastes:

- Overproduction
- Inventory
- Waiting
- Conveyance
- Motion
- Unnecessary Processing and Setup:
- Defects
- People's Skills

2.6. 'Lean' and QMS

Robitaille (2004) signifies ISO 9001 as an elegant, albeit generic, model that applies remarkably well to a diverse array of organizations, and hence a certificate signifies a commitment to quality. Robitaille (2004) further elaborates that it projects a level of excellence that helps maintain customers' confidence in a product. In fact, good lean practices complement a QMS. Efficient, well-implemented supplier monitoring programs, for example, might initially incur costs but will ultimately reap benefits from more consistent and reliable vendor performance. This, in turn, results in fewer returns, fewer costly interruptions to production schedules and a decreased risk of defects reaching customers.

Puglielli (2008) explains the subject further to clarify the jurisdiction and need of the two concepts as, when a company is growing, compliance to the ISO QMS Standard is imperative to ensure that the controls they have in place are adequate to support their growing needs. But on the other hand, when a company stops any further growth with its systems and controls matured to full extent, the company is compelled to focus on 'Lean' initiatives independent of its QMS.

2.7. Management Principles of QMS and Lean Best Practices

Quality Management System encompasses the principles that are universal to industry and business. Though further varied definitions of these are possible to meet the requirements of a specific industry, still the element of generality is characteristic with Quality Management System. Only standard of quality has to be defined first by the organization itself and then those standards have to be met accordingly. Following are the eight management principles (Westgard, 2005) pursued by the Quality Management System:

i. *Customer-focused organization;* the concept of Customer Satisfaction is central to ISO QMS. Organization is expected to cater for the customer needs both current and future.
ii. *Leadership*; management commitment and vision provide direction to the whole organization helping greatly to focus on the relevant issues.
iii. *Involvement of people*; complete participation of employees is must in successful implementation of ISO and maintaining the

gains of an ISO certification. Decentralization in this respect could be more beneficial to give a chance to employees to bring forward their underutilized skills and knowledge.

iv. *Process approach*; management can use several quality and statistical tools and techniques to improve the processes as a set of interrelated activities transforming inputs into outputs, as identified by ISO.
v. *System approach***;** ISO believes in establishing a System as a collection of interrelated processes, easy to be directed towards specific objective in an efficient manner.
vi. *Continual improvement;* ISO, as a system, is based on continuous improvement and innovation rather than a one-time exercise.
vii. *Factual approach to decision making*; in-time decision making is must and mainly depends on accuracy of data collection and correct analysis as emphasized by ISO implementation process.
viii. *Mutually beneficial supplier relationships*; ISO standards are designed to promote the abilities of organizations to create value and hence support profit making.

As per Donovan (2011), Lean Manufacturing is attributed with quick response, lower inventories, higher profits, better quality and total customer satisfaction. Thus, superior world class competitive performance needs following practices to be rigorously followed to boost up the performance of the respective areas:

a. Management's commitment.
b. Time Cycle reduction.
c. Inventory reduction.
d. Customer focus.
e. Structured flow.
f. Overall performance improvement in terms of periodic product design review etc.
g. Employee participation.
h. Quality planning and cost control.
i. Information technology.
j. Total preventive maintenance.

Here it can be observed that the two approaches have a lot common and pursuing ISO certification doesn't imply avoiding Lean. In fact, these two approaches offer diverse advantages and benefits to an organization without necessarily intersecting each other's objectives and interests, instead complementing each other. The most important thing to learn is that the two approaches are not mutually exclusive. ISO certification should not prevent an organization from implementing Lean. However, ISO must provide the umbrella, directing towards broader goals and paving the way for gross waste elimination through Lean implementation and hence improving the value stream. The most important factors to be kept in focus, conducive to parallel implementation of the two approaches, are extensive training and significant cultural changes.

3. METHODOLOGY

3.1. Research Approach

In this study, qualitative approach has been used to collect the data through a questionnaire, designed and derived from the Donovan (2011) model, and modified according to the needs of the ten Public Sector Organizations focused for the purpose. Managers belonging to diverse tiers of the Management of these 10 organizations have been targeted to reach at a consensus in identifying the areas where the gaps and lapses actually occur with respect to the significance of that particular area, and the actual status of implementation.

3.2. Questionnaire Type

The current study has employed a questionnaire comprising of 20 closed ended questions for ease of answering, standardization and statistical analysis. The design of the questionnaire is such that each major area of Lean Manufacturing has been addressed with two representative questions to be answered. In total, there are 20 closed ended questions aiming at respondent's feelings about the effective implementation of a Lean Manufacturing feature. The response is in two parts as follows,

a. *Feature's Importance*: in this part, the respondents were urged to assess all the features by using a 5 – point LIKERT scale, ranging from "1 – Insignificant" to "5 – Very Important".
b. Implementation in Organization: this part reflected the respondent's opinion about the actual implementation level of that particular Lean Manufacturing feature in the respective organization.

The questionnaire is divided into ten sections, each corresponding to a specific area or feature concerned with Lean Manufacturing, including,

i. Productivity
ii. Inventory
iii. Structured Flow
iv. Performance Improvement
v. Employee Participation
vi. Management
vii. Quality
viii. Customer Focus

ix. Information Technology
x. Total Preventive Maintenance

3.3. Sample Selection and Size

Ten Public Sector Organizations with a cumulative strength of about 350 Managers, belonging to top, middle and lower levels, were targeted in this research. For a sample size of 112 respondents, 200 questionnaires were distributed. Out of 200, 120 questionnaires were received duly filled in all respect. Hence the response rate remained 60%.

3.4. Brief Method to Calculate Lean Implementation Gap

Following is the method to calculate the Lean Features' Implementation Gap.

a. There are ten dimensions of Lean Manufacturing.
b. Each dimension is characterized by two representative questions.
c. Response to these questions is divided into two sections i.e. 'Importance' and 'Implementation'.
d. Response to 'Importance' and 'Implementation' varies on a Likert Scale from 1 – 5.
e. Lean Implementation Gap = Implementation – Importance.
f. A negative number reflects an existence of a gap between the effective implementation of that particular feature as compared to its significance. A positive number represents a satisfactory status.
g. Calculate gap for each question.
h. Determine the average gap for all questions of a particular dimension.
i. Calculate the average gap for all the ten dimensions. This should be the average Lean Implementation Gap for single respondent.
j. The individual Lean Implementation Gap scores for all respondents might be calculated to determine the overall Lean Implementation Gap present in the system by taking their average.
k. The dimension with the lowest average gap score will be the most Critical Dimension.

4. RESULTS AND ANALYSIS

A brief description of the response trend of 120 respondents is as shown in the Table 1

The response to brief remained healthy as an appropriate proportion of all the three major categories of Management has been obtained contributing towards a more reliable result to be inferred.

Table 1. Response Rate

Respondent's Category	Total	Cumulative	Percentage
Managing Directors and Board Members	12	12	10
General Managers	36	48	30
Assistant Managers and Managers	72	112	60
Total	120	-	100.0

The data generated by the response of all the 120 respondents of the Questionnaire has been depicted in a graphical manner as shown in the Figure 1. The abscissa depicts the Lean Features, while ordinate depicts the average Lean Implementation Gap as a corresponding negative number, following the method as described earlier to calculate the overall Lean Implementation Gap for each Lean Feature. Each individual bar is topped by the relevant value for ease of comprehension. The graph encompasses the whole picture of the current status of the production systems, as depicted in the opinion of the respondents, illustrating in a comprehensive manner the areas where a gap between the significance of a particular Lean Feature, duly supported by the already implemented ISO Quality Management System Standard, and the on ground effective implementation actually occurs. This of course is a very simple and direct method to approach and attack the targeted area as elucidated by the graphical representation, and where the performance is clearly lacking and thus affecting the overall output of typical Public Sector Organizations.

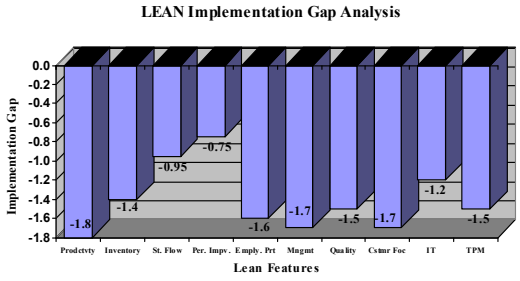

Figure 1. Lean Implementation Gap

From the graphical presentation of the questionnaire response, as shown in the Figure 1, it can be observed that all the Lean Features bear a negative value that reflects a clear cut gap between the importance of that particular feature as per vision and opinions of the respondents and their actual experience regarding an effective implementation of that particular Lean Feature in their respective organizations. An overall Lean Implementation Gap comes out to be **– 1.41**, which proves the existence of a lapse between the goals and objectives pursued by

these Public Sector Organizations under the umbrella of the ISO Quality Management System Standard, and the actual on ground state of affairs.

From Figure 1 the most critical and neglected Lean Manufacturing area turns out to be **Productivity,** which encompasses need for reducing the product cycle time and eliminating the non-value-added activities to bring down the production cost. The implementation gap for **Productivity** comes to – **1.8**, which is greater than the overall Lean Implementation Gap rating of – **1.41.** The second most critical category of Lean Feature is shared by two areas, i.e. **Management**, in terms of its commitment and efforts to produce an environment conducive to fostering Lean Practices, and **Customer Focus**, with respect to focus the customer feedback system and customer satisfaction, both of whom showed lean implementation gap of – **1.7**. **Employee Participation** remains the third most critical Lean Manufacturing Feature with a score of – **1.6**, which is reflective of a lapse or gap of what is emphasized in the Quality Management System Principles under the title of 'involvement of people'. It is significant to mention here that the other Lean Features also fall in the same category of neglect with a very minor difference in scoring and also in negative figure. Not a single Lean Feature has been found to achieve the status of 'rigorously implemented' or otherwise seemed as satisfactory with a positive scoring figure.

4.1. Pareto Analysis

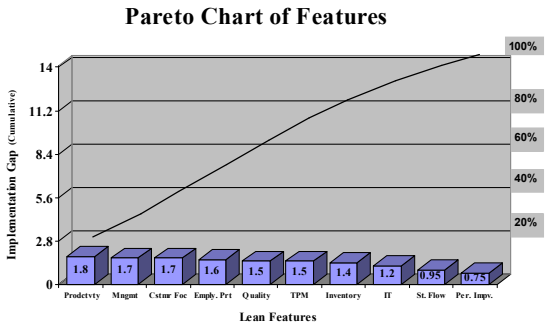

Figure 2. Pareto analysis lean implementation gap

Pareto analysis is an effective tool that can be used to elucidate the vital few factors from trivial many that may be source of the problem. Figure 2 shows Pareto analysis of the Lean implementation gap both in terms of individual lean feature ratings and their cumulative percentage. However, the Pareto analysis fails to establish any major lean features as contributing factor as the cumulative of seven of the ten Lean Features contribute 80% of the aggregate Lean Implementation Gap.

Hence, all ten features are responsible for presence of lean implementation gap in the public sector organizations.

4.2. Service Experience Wise Overall Lean Implementation Gap

A graphical representation of the service wise trend of response towards overall Lean Implementation Gap is shown in Figure 3. The service axis has been divided into three categories according to the experience of the Managerial cadre, such as Assistant Managers & Managers representing the First Line Management, General Managers representing the Middle Management, and Managing Directors and Board Members as Top Management.

Figure 3 reveals that Lean implementation gap exits in the view of all three cadres of service all but with varying degrees of severity. In Top Management's view, the severity level of the problem is of the magnitude of – **1.35** which is closer to the view held by First Line Management scoring at – **1.3** in magnitude. On the contrary, the Middle Management holds a more harsh view of the situation by scoring at – **1.6** of the magnitude. This difference in opinion is explained as the Middle Management, in contrast to the other two tiers of management, face a more tense situation for being responsible of both implementation and compliance to the business policies as dictated by the Top Management, without being given much liberty to influence it, and also to come out with results according to the expectations of the Top Management, despite of the resistance and other valid issues raised by the First Line Management and workforce. Therefore, Middle Management is found keener to eliminate the lean implementation lapses.

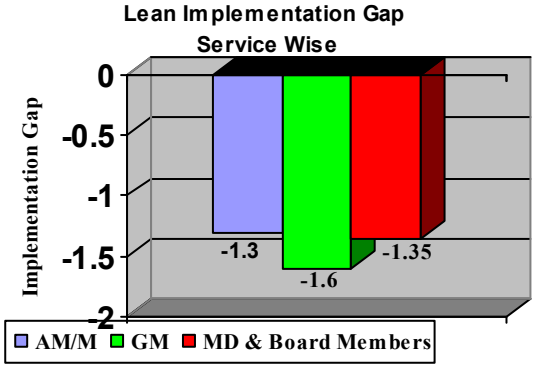

Figure 3. Lean Implementation Service wise

4.3. Priority Lean Features in Individual Service Cadre

Figure 4, 5, and 6 illustrate the individual Lean Features that respective Management level feel have the highest impact on Lean implementation gap and need to be prioritized. This sort of graphical presentation is a great help in analyzing the difference of approaches in viewing the problem at different tiers of Management overall.

The Figure 4 shows that for the Top Management's feels that priority areas are Productivity, Information Technology, and Quality that need to be addressed first to eliminate the Lean Implementation Gap. This is mainly because Top Management is more conscious about the product cost, responsiveness in terms of lead times to meet the commitments and thereby increasing the market share. Information Technology is considered a very important tool that helps in timely decision making and therefore given importance. Quality of product is a chief concern and the illustrated outcome coincides with the achievement of ISO QMS certification which Top Management normally craves.

Figure 5 reveals the general trend of the Middle Management, which seems more and more conscious of and sensitive to Top Management's Commitment to pursue the Lean Manufacturing Process as Business Strategy in their respective organizations. Hence, to divert the attention of the Top Management towards some important issue of Lean Manufacturing and win their commitment on for long term is considered to be the primary achievement. The other two main priorities for Middle Management are employee participation and structured flow in the shape of balanced production lines.

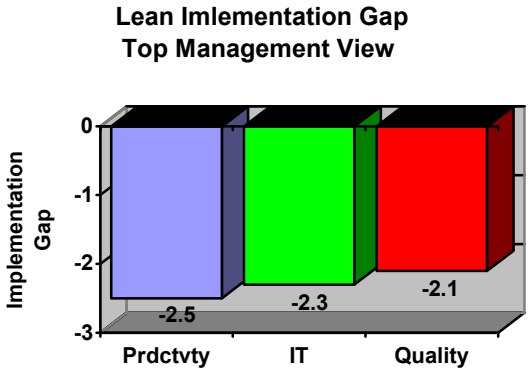

Figure 4. Top Management View, Priority wise

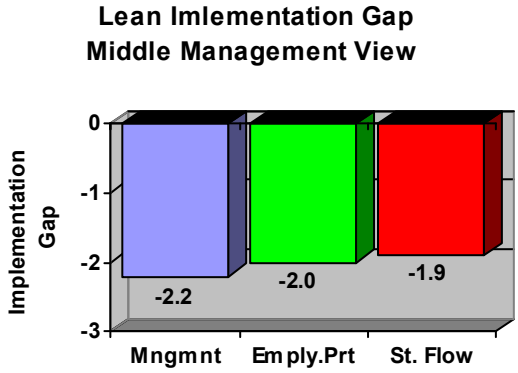

Figure 5. Middle Management View, Priority wise

Figure 6 explains the general trend of the First Line Management in viewing the problem of Lean Implementation Gap by prioritizing Productivity as the main area of concern and focus. This trend can easily be explained as the First Line Managers are normally heavily engaged in daily shop floor level production activities and are more and more sensitive and conscious about the in time completion of production targets.

They envisage production to be directly and severely affected by exaggerated cycle times and other non-value-added activities. First Line Managers are also sensitive to management style and policies that regulate their organizations. This is especially true about the commitment of Top Management in pursuance of a Lean Manufacturing which typically needs drastic and radical steps to be taken within minimum possible time limit. Finally, First Line Managers put the Total Preventive Maintenance on priority since they cannot deliver without an assurance on the behalf of the maintenance department that the plant and machinery involved in the production would remain operational and precise with minimum chance of a surprise breakdown jeopardizing the whole production planning.

Figure 4, 5, and 6 reveal that a problem or deficiency in implementing a Lean Feature is not necessary prioritized by all the tiers of Management equally. This reflects:

- The presence of Lean implementation gap is all key features of the organization
- The existence of lack of communication among various tiers of Management.

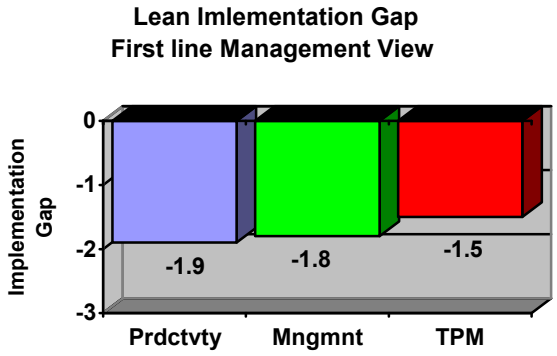

Fig. 6. First Line Management View, Priority wise

5. RECOMMENDATIONS

A thorough analysis of the survey conducted by this study has revealed some very important aspects as discussed in the previous section, and following are the recommendations to address these hitherto neglected areas, especially in the public sector organizations:

- The survey result has arrived at a consensus that Productivity is the area or prime importance to be focused for Business Process Improvement by controlling the product cost through a systematic and periodic review of cycle time and also through the identification and elimination of various non-value-added activities. The typical Public Sector Organizations, owing to their lack of initiative and a culture promoting rigidity and status quo, lags behind in utilizing the concept of 'organizational learning' and hence are suffering a heavy loss.
- The survey report elucidates the lapses present at the end of Management to convey its firm Commitment to pursue Lean Manufacturing as a Business Strategy. The domain of Customer Focus met the same fate. It is pertinent to mention here that both the concepts use to be the primary, most emphasized and most highlighted principles of ISO Quality Management System Standards. The survey reveals both of these areas to be the potential improvement subjects through the implementation of the Best Lean Practices.
- All the managers of the organizations under consideration have unequivocally declared the serious lapses in motivating and empowering the employees in order to win their participation and involvement in the improvement of the business processes and hence being a potential improvement area must be focused for rigorous improvisation.
- The survey report has also been successful in highlighting the communication gap present among the various tiers of management while conceiving problems the respective organizations are suffering with. The responsibility lies mainly with the Top Management to actively promote and pursue a healthy environment of communication free from fear and rather rewarding for valuable suggestions. This would certainly deplete the communication gap with the organization and would surely keep it from becoming a typical 'stove piped' organization.
- Total Preventive Maintenance coupled with the Cost of Quality has cropped up to be the major area of concern, since a faulty plant and machine not only destroys the quality of the product but also contribute to the cost of quality relying more and more on unnecessary inspection stages as well as in the shape of production of defective parts. The area needs a serious and thorough analysis that how and to what level of investment on the storage and availability of essential spares may guarantee smooth production.
- Somewhat mix response is observed regarding maintaining an appropriate level of Inventory. But, over all, a hoard of various kind of inventories has unanimously been looked upon and considered a hurdle by most of the Managers. But its unnecessary occurrence needs to be addressed on immediate grounds.
- The benefits of IT have been generally been accepted but its haphazard, discontinuous, and fragmented use has highlighted to be the cause of much commotion in the organization. this lapse in the concept of IT as an enabler and its failure in alleviating the load of unnecessary paper work has yet to be addressed.
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6. CONCLUSION

This study has basically been conducted to clarify the potential areas of improvement in the production systems of typical Public Sector Organizations that suffer with organizational rigidity and lack of commitment and initiatives for continuous improvement. The study has remained successful in establishing the fact that even in Public Sector Organizations with status of ISO Certified QMS, serious lapses occur in the implementation of Lean Manufacturing Practices in their respective production systems in terms of the elimination of various kinds of wastes and the non-value-added activities. It has also been revealed that there is much in common between the ISO QMS Standards and the LEAN MANUFACTURING SYSTEM, particularly in terms of Leadership Commitment, Employee Participation and Involvement, Quality and Cost of Quality, and Continuous Improvement in the system to eliminate unnecessary activities etc. and in fact both the major approaches can compliment each other in enhancing the over all performance of the organization.

The study has also been successful in illuminating the existence of communication gap and the difference of views among various tiers of management, emphasizing the need that all the working groups should be on the same grid while undertaking a major reformation initiative.

Finally, the study has elaborated in clear terms the need and potential of Business Process Re-design Initiatives and other Business Process Improvement techniques to establish Lean Production environment conducive to a streamlined, waste free production system.

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