

Chapter 3

Lean Manufacturing Scenario and Role of Pervasive Computing in Indian SMEs

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ABSTRACT

Large scale firms have been adopting various management practices to remain competitive in today's global economy. Lean manufacturing is one such initiative, which significantly improves performance in terms of cost, delivery, quality and flexibility. Although small and medium enterprises (SMEs) play a very significant role in overall manufacturing supply network, less is known about the extent to which lean is present in these firms. The present study investigates this issue by exploring the scenario of implementation of lean manufacturing in Indian SMEs. It also examines the constraints, which need to be addressed for real penetration of lean on a wider scale and the role information and communication technologies like pervasive computing play in successful implementation of this initiative. This aspect is considered important as no organization, whether big or small, can afford to neglect it in today's business environment. The study reveals that although lean manufacturing is not implemented as a formal management initiative in SMEs, its elements could be traced with varying degrees in firms. However, a need is felt to improve upon various identified constraints, so that SMEs are able to implement it as formal system and reap maximum benefits. It is also experienced that IT solutions like pervasive computing help in improving lean manufacturing performance but Indian SMEs in general have not taken considerable initiatives in this direction.

INTRODUCTION

Small and medium enterprises (SMEs) play a vital role in Indian economy as more than 50% of coun-

try's GDP is contributed by them. SMEs are also the backbone of manufacturing sector as they form critical upstream supply network to the large-scale firms and OEMs. Like their counterparts in other regions of world, Indian SME are characterized with family based businesses with loose manage-

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ment structure, poor investments levels in new technologies and processes, lack of competent manpower, inadequate research and development facilities and constrained financial resources.

These constraints in SMEs have caused them to lag behind large-scale firms in implementing improvement initiatives like Just in Time (JIT), Total Quality Management (TQM), Total Productive Maintenance (TPM) and lean manufacturing. Therefore, such management practices have not received any appreciable attention in SMEs globally (Gunasekaran, 2000). This is despite the importance of improving competencies in small and medium scale industry being emphasized by many experts. For example, need to focus on areas like quality, just in time manufacturing, problem solving and lean management was highlighted by Hall (2005). Lavinson (2002) also stressed upon the inevitability of lean manufacturing in SMEs to face global competition. However, limitations in terms of management style, manufacturing practices and level of expertise have been the major bottlenecks (Little & McKinna, 2005). Therefore, realizing the importance of SMEs for Indian manufacturing industry, this subject is considered to be of important nature.

Lean manufacturing was originally developed in the Japanese auto industry by Taiichi Ohno. Lean or Toyota Production System (TPS) has its origin from the Toyota's unique way of manufacturing. It requires focus on making product flow through value adding process without any interruption - a 'pull system' that cascades back from customer demand to manufacturing to raw material procurements. It intends to eliminate all kinds of waste from any productive system (Liker, 2004). Various important elements of this system include six-sigma quality, visual display, defect prevention, one-piece flow, Kanban, setup time reduction, quality at source, just-in-time supply, preventive maintenance, value analysis and value stream mapping (Womack, Jones & Roos, 1990). Although the origin and development of lean manufacturing is from automotive sector but

these elements can be found in any manufacturing environment in varying degrees of importance and intensity. The key issues addressed by lean manufacturing are (Wiele *et al.*, 2006)

- Value – providing the customer with right product and service for right price and at right time
- Value Stream – set of activities from concept to realization, order to delivery
- Flow- seamless movement through a series of value adding activities
- Pull – taking only those actions which satisfy customers
- Perfection – improving value continuously and relentlessly alongwith associated reduction in defects

Therefore, it can be seen that lean manufacturing is combination of a large number of management practices, which are all important for its success. Macduffie (1995) divided these into three parts – buffer minimization or JIT, work systems and practices to support lean and human resource management. Importance of these has been cited by various researchers (Macduffie, 1995). Various elements of these major groups are

- A: Just in time or buffer management
 1. Pull type of manufacturing system
 2. Small lot production
 3. Rapid feedback system
 4. Waste reduction programs
 5. Quick changeover and SMED
 6. Mistake proofing
- B: Work systems and practices
 1. Relationship with suppliers to improve their performance
 2. Kaizen and continuous improvements
 3. Equipment management
 4. Rapid product development
 5. Quality assurance and total quality management
 6. Information architecture

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