

---

## IMPLEMENTING LEAN MANAGEMENT IN ANDROID MOBILE/TABLET

TIRUMALASETTY SIRISHCHANDRA, T SENTHIL KUMAR

---

**Abstract:** In this paper we are going to present a new method of implementing lean operations management in mobile phone. Basically lean refers to a production practices that considers only those resource expenditures required to pursue and achieve goals directly related to the creation of value for the end customer. Aligned with such lean practices technologies and tool sets can be developed that would enable build capabilities in PSUs/MSMEs. This will take place by only implementing 'LeanMB-OPM' system for MSME units that will result in effectively managing resources, activity or processes for enhanced value creation with enhanced visualization and that would enable to take corrective interventions while monitoring operations. Since Android is open source operating system and effective flexibility programming makes to develop such application. And most of all its application supporting library packages makes it more selectable for application development. Besides these its smart features and interactive UIs makes comfort for any large applications.

**Keywords:** Lean, lean practices, LeanMB-OPM(lean mobile based operations management), MSME(Micro,small and medium enterprises), Android, smart features, interactive UIs.

---

**Introduction :** With an enhancing demand of enterprises sustainability, many firms embrace the strategic importance of lean management practices for competitive advantage. So mostly many of organizations are deploying the lean manufacturing and management goals in their procedures of resulting outcomes. So here for any MSME, it can make lean practices and achieve their goals using Android mobiles/Tablets.

It has been analyzed that Android applications, without any user annotation of the code, yielding formally correct results in a few minutes and on a standard hardware, so it is ready for a first industrial use[1].The rest of the paper describes about how the lean term is deployed in android platform and application development in sections wise. Section 2 specifies the objectives and innovative approaches. Section 3 includes the lean and lean management process along with lean manufacturing goals and practices that should be followed for an enterprises. Section 4 involves functional requirements along with the respective flow diagrams. Physical system simulation is described in section 5 along with the Model diagrams and details of it. Section 6 Explains the development of application. Section 7 shows some snaps of the application which entitles operations in Android mobile by following smart features and interactive UIs. Conclusion and future work is keyed in section 8.

### Objectives

- Development and implementation of solutions towards realizing lean manufacturing goals.
- To develop a rapid prototyping approaches for replication of the solutions across MSMEs.
- Build a realize capacities with demonstrated results that encourage adoption.
- Solutions to present Visualization of material flow, capacity utilization, manpower deployment,

utilization, productivity, activity costs, production planning & scheduling, production status, etc

### Lean : A.Lean management

The term Lean was coined to describe Toyota's business during 1980s by a research team headed by Jim Womack; Lean is an idea to maximize customer value while minimizing waste or in a lucid way Lean means creating more values to customer with fewer resources. The Lean implementation methodology (Lean) has its roots in manufacturing and has expanded beyond manufacturing to become an improvement methodology. **Lean Management** is about expanding capacity by reducing costs and shortening cycle times.

Lean management addresses the purpose problem by identifying product family value streams for specific customers:

- ✓ Makes value easier to specify.
- ✓ Makes the flow of value easier to see.[2]

### B.Lean manufacturing and its goals

Lean manufacturing is a variant term of efficiency based on optimizing flow. Lean manufacturing focuses on the systematic elimination of wastes from an organization's operations through a set of synergistic work practices to produce products and services at the rate of demand.[4] Lean manufacturing represents a multifaceted concept that may be grouped together as distinct bundles of organizational practices[5].

Lean manufacturing goals that should be followed by any organization are

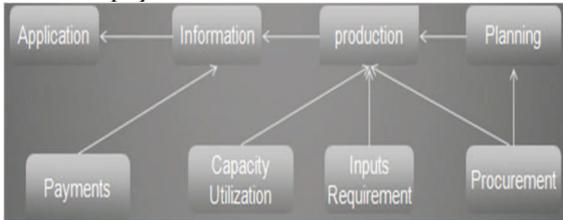
- ✓ Reduce costs within its operations, office & administrative expenses.
- ✓ Improve customer satisfaction
- ✓ Eliminate waste

### Functional requirements

Functional requirements that are to be considered in the design of systems, and associated processes relate to the following functions:

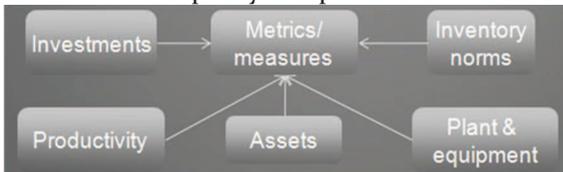
**A.Data capture function**

To obtain data from various Input entities performing various roles. The information is dynamic and relates to data concerning production planning, procurement, raw material or inputs requirement, procurement, machine loading, capacity utilization, production, packaging, sales, pricing, payments to vendors, payments from clients, etc.



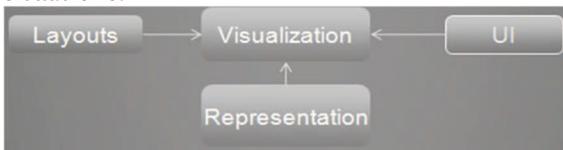
**B.Operations metrics, parameters classification function**

To determine metric values / norms for inventory, assets, plant and equipment; investments, resources or such other capacity and performance measures.



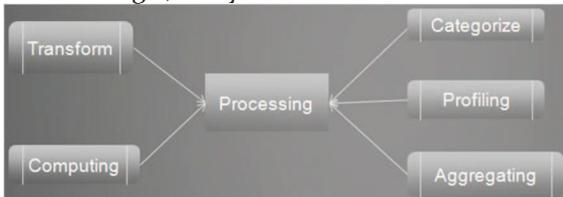
**C.Manufacturing Simulation / Visualization with interactive features and data display**

Involving integration of physical systems modeling to facilitate better comprehension, interactive display of information adapted to context and decision making situations.



**D. Information Processing function**

To categorize, profile, aggregate, transform or perform such other computations in keeping with business logic, analysis or models.



**F. Performance monitoring function**

To manage costs, operations, programs, and outputs according to management needs and external reporting requirements. And also last but not the least, Integration function which provides the basis for required data interchanges between systems that support managerial control directly with other systems that provide or receive information.

**Physical system simulation**

Simulation model is the term used to indicate all forms of model which are explicitly aimed at

investigating basic characteristics and behavior of a system or process. In physical systems made from a large number of simple elements, interactions among large numbers of elementary components yield collective phenomena which can be summarized in terms of states or as a set of performance indicators.

Computer simulation models attempt a detailed analysis of the system leading to a mathematical formulation of its behavior which can be implemented to simulate the dynamics of the system being modeled. While dynamic analysis leads to more accurate predictions of behavioral characteristics of the system involved,

Models can capture the key dynamic features in a simplified form. Their reliability can be improved by incorporating observations and simulated behavior of the system using mathematical formulations or neural network systems to map non-linearity of relationships between input variables and output.

Conceptual & Logical View	
Organisational Model	Information Model
Functions/ operations, Structure Division of Work Method of work	Information to be delivered to who, when & where Information Schema/ views, presentation in GUI
Process Model	Data Model
To execute & create information from data Process control Business Rules Workflow, alternate flows	Structure – tables, data fields, indexing, redundancy, Content of Stored data

Conceptual & logical view model

Implementation View	
Organisational Model	Information Model
Functions, tasks performed in various roles, Reporting structure User procedures	Information in Programming language Declarations Initial data sets
Process Model	Data Model
Processing in programming language terms, Communication, Integration of data	Structures/ relationships in disk arrays, tape

Implementation view model

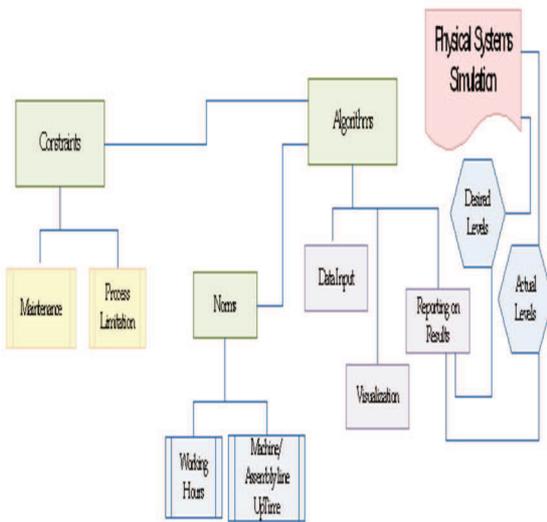
**Development of application**

A typical Enterprise application is architected using multiple software modules and components, that are organized in layers that interface with each other, providing the required capabilities. The modules call each other passing information & parameters in ways that are aligned with the functional requirements and process flow logic. Design documents, schematics, diagrams (artefacts) are documented during the requirements gathering phase of software

## IMPLEMENTING LEAN MANAGEMENT IN ANDROID MOBILE/TABLET

development. These artefacts extensively used to capture the functionality of software, can be activity,

use case diagrams, process workflows.



Normally in android there are 3 core components Activities, Services and Broadcast Receivers. To develop an application in android it requires Java programming. The complete anatomy of android paradigm includes

-Project

-Package

-Source files-java classes

-Gen-R.java

-Android inbuilt dependencies(library)

-Resource-xml files for layouts

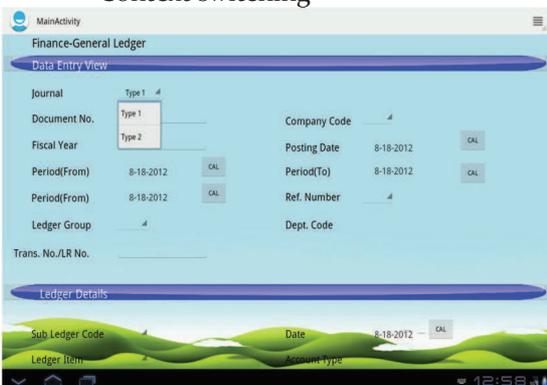
-Android manifest.xml

-Project properties

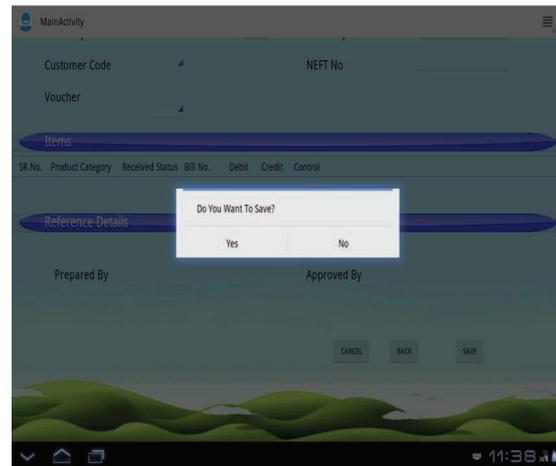
ANDROID VIRTUAL DEVICE EMULATOR  
OUTPUTS

1. Features involved-

- Fragment pane
- Navigation between slides Scrolling and Swipe
- Database(SQLite)
- Interactive UIs using various layouts
- Context switching



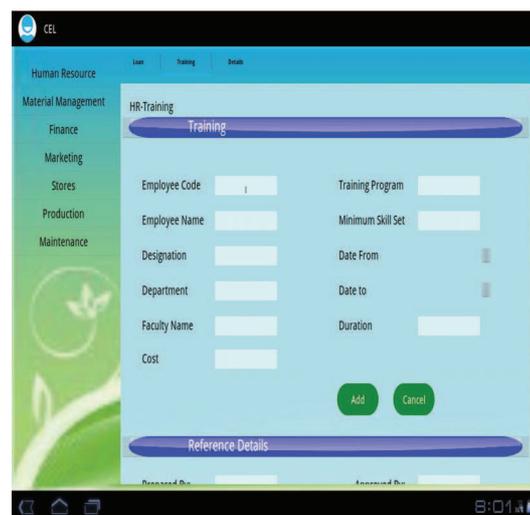
Context Switching



Storing into Database



Interactive UI



Fragment pane

Connectivity with the server that is backend is done by VB, DOTNET.

**Conclusion and Future work :** Our project shows that lean operations management for an enterprise can be done in a mobile environment using Android platform. And also the cost of time can also be reduced by using android since it is first for industrial

use. And also one can add numerous features of android platform for making the application smart and interactive. Future work will be animation in the same project along with security issues also.

### References

1. Static analysis of Android programs; Etienne Payet, Fautso Spoto (2012)xxx-xxx.
2. Android-a programmer's guide, Jerome(J.F) DiMarzio.
3. Impact of lean manufacturing and environmental management on business performance:An empirical study of manufacturing firms; Ma Ga (Mark) Yang,Paul Hong, Sachin B.Modi.(Womack et al.,Fullerton et al.,2003Simpson and Power,2005;Shah and ward,2007)
4. Android.developers.com
5. stackoverflow.com

\*\*\*

<sup>1,2</sup>Department of Computer Science, SRM University, Kancheepuram, India.  
sirish\_xtrem@yahoo.com,senthilkumar.t@ktr.srmuniv.ac.in