

ABSTRACT

Keywords: Lean Manufacturing Management (LMM), Automotive Manufacturing, Collaborative, Knowledge-Based (KB), Gauging Absences of Pre-requisites (GAP), Analytic Hierarchy Process (AHP), Malaysia

The automotive manufacturing facility is extremely complex and expensive system. Managing and understanding the dynamics of automotive manufacturing is a challenging endeavour. In the current era of dynamic global competition, a new concept such as Collaborative Lean Manufacturing Management (CLMM) can be implemented as an alternative for organisations to improve their Lean Manufacturing Management (LMM) processes. All members in the CLMM value chain must work together towards common objectives in order to make the LMM achievable in the collaborative environment.

The novel research approach emphasises the use of Knowledge-Based (KB) approach in such activities as planning, designing, assessing and providing recommendations of CLMM implementation, through: a) developing the conceptual CLMM model; b) designing the KBCLMM System structure based on the conceptual model; and c) implementing Gauging Absences of Pre-requisites (GAP) analysis and Analytic Hierarchy Process (AHP) approach in the hybrid KBCLMM.

The development of KBCLMM Model is the most detailed part in the research process and consists of five major components in two stages. Stage 1 (Planning stage) consists of *Organisation Environment*, *Collaborative Business* and *Lean Manufacturing* components. Stage 2 (Design stage) consists of *Organisation CLMM Capability* and *Organisation CLMM Alignment* components. Each of these components consists of sub-components and activities that represent particular issues in the CLMM development. From the conceptual model, all components were transformed into the KBCLMM System structure, which is embedded with the GAP and AHP techniques, and thus, key areas of potential improvement in the LMM are identified for each activity along with the identification of both qualitative and quantitative aspects for CLMM implementation.

In order to address the real situation of CLMM operation, the research validation was conducted for an automotive manufacturer's Lean Manufacturing Chain in Malaysia. Published case studies were also used to test several modules for their validity and reliability. This research concludes that the developed KBCLMM System is an appropriate Decision Support System tool to provide the opportunity for academics and industrialists from the fields of industrial engineering, information technology, and operation management to plan, design and implement LMM for a collaborative environment.

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GLOSSARY

AHP	Analytic Hierarchy Process
AI	Artificial Intelligence
AM	Application Manager
BOM	Bill of Materials
CBR	Case Based Reasoning
CLMM	Collaborative Lean Manufacturing Management
CR	Consistency Ratio
CRP	Capacity Requirement Planning
ES	Expert System
FL	Fuzzy Logic
FMA	Failure Mode Avoidance
FMEA	Failure Mode and Effects Analysis
GA	Genetic Algorithms
HR	Human Resource
ISO	International Organization for Standardization
JIT	Just in Time
KB	Knowledge Based
KBCLMM	Knowledge Based Collaborative Lean Manufacturing Management
KBS	Knowledge Based System
MPS	Master Production Schedule
MRP	Material Requirements Planning
MRP II	Manufacturing Resources Planning
NN	Neural Network
NPD	New Product Development
OEM	Original Equipment Manufacturer
PC	Problem Category
PERODUA	Perodua Manufacturing Sdn. Bhd.
PHN	PHN Industry Sdn. Bhd.
POM	Production and Operations Management
PROFEN	Profen Sdn. Bhd.
PROTON	Perusahaan Otomobil Nasional Sdn. Bhd
QFD	Quality Function Deployment
RCCP	Rough Cut Capacity Planning
SCM	Supply Chain Management
SPC	Statistical Process Control
TQM	Total Quality Management