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Operational excellence assessment framework for manufacturing companies

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Abstract

Operational Excellence (OE) is a consequence of an enterprise-wide practises based on correct principles that can be classified under four dimensions; Culture, Continuous Process Improvement, Enterprise Alignment and Results. To achieve OE, organisations have to attain a high maturity level and measurable success in the four dimensions as assessed externally by accredited institutions or consultants. External assessment is costly and can be inaccurate due to the lack of in depth knowledge of the organisation by external assessors, on the contrary, self-assessment of an organisations OE is cost effective and accurate if performed with a complete tool which assesses all four dimensions of OE. A complete OE self-assessment tool is currently unavailable, thus this study focuses on the development of a complete OE self-assessment tool. Using a matrix to critically evaluate and compare existing self-assessment tools in areas such as dimensions assessed, scoring criteria and usability, a complete self-assessment tool is then developed based on the combination of existing assessment tools. The tool is validated through the application, by managers, within a manufacturing company that already implements aspects of lean in order to self-assess its OE. The results of the assessment form the basis on which a roadmap to achieving OE is then developed.

1. Introduction

The increase in global competition and the need to reduce cost of operations during difficult economic climates have become the main drivers for organizations to introduce continuous improvement and eliminate non-value adding operations. Since the introduction of the Ford Mass Production line in the 1900s by Henry Ford, there has been an evolution from workplace improvements and mass production techniques to Lean manufacturing which has become the 'buzz word' of modern manufacturing (Figure 1) [1]. However, many organizations in recent times have become too reliant on the concepts and tools of Lean Manufacturing, Total Quality Management and Six-Sigma such as Kaizen and Overall Equipment Effectiveness. While these concepts and tools have helped to improve processes and reduce cost, they have under-delivered in terms of cost savings and process efficiency, a problem which has been attributed to the programmatic tool-oriented deployment of these concepts [2].

To successfully implement good improvement tools, it is the underlying principles of these tools that have to be focused on rather than the application of the tools. The concept of Operational Excellence (OE) goes beyond using individual tools and techniques. It incorporates Lean principles with organizational culture and management at a strategic level.

OE has been defined as a consequence of an enterprise-wide practice of ideal behaviors based on the correct principles [2] or simply as a state where each and every employee can see the flow of value to the customer, and fix that flow before it breaks down [3]. Although these definitions may seem broad, it is the correct principles categorized under four dimensions; Cultural Enablers, Continuous Process Improvement, Enterprise

Alignment and Results (Figure 2) that are fundamental to achieving OE. To achieve OE, not only do organizations have to implement the correct principles, the principles have to also be deeply embedded within the organizations culture. The culture of excellence ensures that everyone within the organization knows the 'why' behind the how and the what, as taught by Dr. Shigeo Shingo, a pioneer of OE. [4].
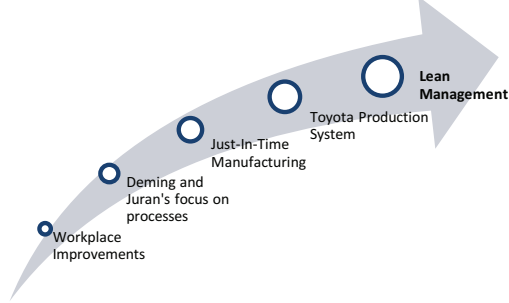

Fig.1. Summary of the evolution from workplace improvements to Lean Management. (Adapted by Naftanaila [1])
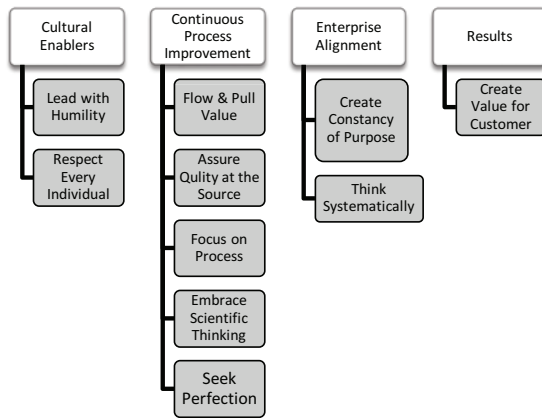

Fig.2. OE dimensions and their underlying principles (Shingo, [4])

The use of assessment tools is one approach that can be adopted by organizations to kick-off their OE journey. Performing assessments serve as a reality check while highlighting the weaknesses and strengths on which organizations can build upon to achieve OE. There are many tools that are currently available for the internal and external assessments of Quality, Lean and Process Improvements for organizations. These tools tend to cover some principles of OE and thus failing to realize how dependent the principles of OE are on each other. In most cases, for example, tools either assess Continuous Improvement or the Results dimensions without taking into account the impact of organizations culture on either.

The aim of this research therefore is to develop an assessment framework based on OE principles for the assessment of manufacturing companies who are struggling with the implementation of lean initiatives. From the assessment results, a roadmap to OE for the organization can then be developed.

2. Review of Existing Assessment Frameworks

Table 1 presents a list of existing assessment tools in the areas of Quality, Lean, Culture and Operational Excellence and the dimensions of OE they assess. From the list, it can be deduced that majority of the existing assessment tools are focused on the process improvement and results dimension of OE with only the Shingo assessment tool, solely used by the Shingo Institute in Utah and is therefore not made available to organizations for internal assessments, covering all 4 dimensions.

To develop an OE assessment framework, a review of the existing tools; Shingo Assessment [5], European Foundation for Quality Management (EFQM) [6], Malcom Baldrige National Quality Award (MBQA) [7], Kobayashi 20 Keys of workplace improvement [8], Lean Enterprise Self-Assessment (LESAT) [9], Rapid Plant Assessment (RPA) [10] and Good-to-Great assessment [11] tools were evaluated under 4 requirements as detailed in Table 2.

Table 1. Assessment tools and OE dimensions they assess

	Culture	Process Improvement	Enterprise Alignment	Results
Shingo	■	■	■	■
EFQM	■		■	■
MBQA	■		■	■
RPA	■	■	■	
Kobayashi		■	■	
LESAT		■		■

Table 2. Requirements for OE assessment framework to be developed

Requirement	Purpose
Assessment Style	Assessment style of the assessment tool is critical to the assessment framework to be developed as it allows personnel within the organisation to readily assess their organisations performance; at a significant lower cost compared to external assessments. In addition, it allows for the easy monitoring of the cultural aspect of an organisation as internal assessors are usually personnel with in-depth knowledge of the organisation.
Scoring	OE maturity levels defines how well the principles of OE are embedded within an organisations culture. OE maturity levels are categorised from Level 1 (20%), Level 2 (40%), level 3 (60%), level 4 (80%) and level 5(100%) depending on the total score from assessments, by existing OE tools. The scoring system adopted for the assessment framework to be developed has to be in line with the maturity levels to allow organisations to easily identify where they belong.
Accuracy of Results	Organizational culture is the main pillar of OE as it reveals the extent to which the principles of OE are embedded within the organization. To accurately assess this, assessment tools have to probe the culture of an organization in depth. This process can only be done over a long period of observation and interaction with organization personnel. Rapid assessment tools are therefore not best suited for the assessment of culture within an organization.
Areas Assessed	To assess OE, all 4 dimensions; Culture, Process Improvement, Enterprise Alignment and Customer Results have to be covered by the assessment tool.