Relationships of Lean, Green Manufacturing and Sustainable Performance: Assessing the Applicability of the Proposed Model

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Abstract - While Lean Manufacturing (LM) focuses on minimization of wastes, Green Manufacturing (GM) emphasizes on achieving zero emissions. Little is known about the linkage between these two initiatives and their integration. Furthermore, it is also not clear whether these two initiatives can coexist in the same organization or not. To address the gaps, this paper highlights the potential synergic effect and proposes a multi-dimensional model based on assumptions (1) GM is represented by the soft aspects of Environmental Management System (EMS), (2) the EMS is the possible mediator in the relationship between LM and Sustainable Performance (SP), and (3) the mediating model can be examined using bootstrapping technique within Structural Equation Modeling (SEM). The contributions of this paper are theoretical in nature which include (i) proposal of a conceptual approach comprising of three integrated models (ii) introduction of the lean manufacturing with four bundles namely, problem solving, process, philosophy and people (LM 4P). Four hypotheses were postulated for the research. The preliminary results indicate that the model is validated by conducting semi structured interviews in few industries in Malaysia. The future direction of this paper is to empirically investigate the model for hypotheses testing through the techniques employed in SEM.

Keywords- Lean; Green; Sustainable; Mediation; Interview.

1. INTRODUCTION

Lean Manufacturing (LM) can reduce waste without additional requirements of resources which enable organizations starting to implement LM that resulted in a plethora of LM definitions, objectives, performance indicators, tools/techniques/methodologies, and concepts/elements [7]. EMS has become one of the main tools used by companies to handle the environmental aspects and the impacts that their activities have on the environment [10]. ISO 14001 certification is excellent for industries to embrace toward sustainable environmental management and benchmarking [4]. Scholars [36] stated that it is important for manufacturing companies to implement LM practices with environmental management as a means of obtaining eco-advantages through improvements in environmental performance. This paper focus on the mediation concept for the following reasons: (1) mediation is a very popular topic (2) mediation analysis tend to be more powerful than moderation analysis (3) When more causal or structural models are examined, the mediational part of the model is the most interesting part of the model. One of the main reasons for the intense interest in testing using mediation is trying to understand the mechanism through which the causal variable affects the outcome [27].