

# **TITLE: Investigations on implementing leagile paradigm and an exploration on the adoption of industry 4.0 to achieve leagility in pump manufacturing industry**

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## **ABSTRACT**

Over the past two decades, many researches have been reported in literature arena under the domains of lean and agile manufacturing paradigms. It is apt to implement lean manufacturing paradigm in companies in which conventional products are manufactured. On the other hand, it is prudent to implement agile manufacturing paradigm in companies in which innovative products are produced. Meanwhile, it was observed that it had been a difficult experience to implement both these paradigms simultaneously in companies in which both conventional and innovative products are manufactured. In order to overcome this difficulty, a few researchers brought out the leagile manufacturing paradigm. As its title implies, the leagile manufacturing paradigm is encapsulated with lean and agile manufacturing principles. Although a section of researchers have been further working on leagile manufacturing paradigm, the implementation of the same is yet to occur in many industries. Pump industry is one such industry in which such implementation is yet to occur. This situation indicates the necessity to examine the need for investigating the practicality of applying leagile manufacturing paradigm in the production of pumps. In order to meet this necessity, this doctoral work reported was carried out. During the first phase conducting this doctoral work, a literature survey was conducted to study the theoretical aspects contributed by the researchers and the state of the art researches conducted in the direction of implementing leagile manufacturing paradigm in real time situations. Then a model which has been named as 'Pumping For Leagility' (PFL) was designed. In order to examine the practicality, three investigations on implementing leagile manufacturing paradigm by using PFL model were conducted. At the end of conducting these three investigations, it was discernible that the enablers of Industry 4.0 could be adopted for efficiently implementing leagile manufacturing paradigm in pump manufacturing industry. In the context of this observation, a rigorous literature survey on Industry 4.0 was conducted. Subsequently, the potential of exploiting the enablers of Industry 4.0 towards implementing effectively and efficiently the leagile manufacturing paradigm in pump manufacturing industry was explored. During the last phase of the doctoral work, the views and opinions of implementing leagile manufacturing paradigm in pump manufacturing companies by using PFL model were gathered. On the whole, this doctoral work has resulted in the contribution of PFL model and exploration on exploiting the enablers of Industry 4.0 for effectively and efficiently implementing leagile manufacturing paradigm in pump manufacturing companies. The practitioners may execute the activities presented under the eight steps of PFL model for implementing leagile manufacturing paradigm in pump manufacturing companies. Thus, a generalised model and exploring the avenues to utilize the enablers of Industry 4.0 for enabling pump manufacturing companies to implement leagile manufacturing paradigm and thereby enabling those companies to move towards becoming world class pump manufacturers have been contributed by conducting this doctoral work.

