

# Use of Value Mapping Tools for Manufacturing Systems Redesign

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**Abstract**—Researchers and practitioners have found that focusing on mapping value is a key issue. Several mapping tools have been used for improving and redesigning manufacturing systems making them to become more competitive, flexible and efficient in order to face market economic challenges in their manufacturing environment. This paper analyzes mapping techniques their evolution, strengths, weaknesses, key aspects to consider and how they have been adapted to real environments with different characteristics.

**Index Terms**—VSM, manufacturing systems, re- engineering, lean tools.

## I. INTRODUCTION

Nowadays, the success of the manufacturing industry is largely determined by its ability to rapidly respond to market changes and to immediately adjust to customer needs. This has resulted in an increasing demand for deployment of systems that can cope with agility and efficiency to these demands [1]. Companies must respond with product designs or completely new products, modifying production processes while seeking lower times and more flexibility in their production systems. It has been studied by several authors that, in order to respond to customer's requirements, flexible systems imply studies about the quickness with which these systems can be modified, the required new configuration should turn the flow to become more agile, in such a way that the production systems will technically be viable and suitable for different purposes.

Law and Mak [1] underline the need for an effective tool in order to develop a manufacturing system or to modify an existing system for a specific requirement at a reasonable time frame and cost. There have been developed several tools that presumed to support those actions such as: process mapping based on flow maps, IDEFO, GRAL, material and flows' modeling and simulation software, mapping techniques based on Toyota production system defects and Value stream mapping.

VSM has been defined by Rother and Shook [2] as a powerful tool that not only highlights process inefficiencies,

transactional and communication mismatches but also provides guides about the improvement and redesign of manufacturing environments. Such useful tool has been evolving through its different applications, under many cases of study, under different environments and contexts.

This paper is an ongoing research to obtain a master degree, which focuses in the analysis of mapping techniques and in showing how these have been used for redesigning manufacturing systems. An existing gap in the literature review has been identified, where a framework is required which may be used as stream mapping support tool to decide which technique is more suitable to the manufacturing environment in which the study is going to be deployed. This may increase or provide more resources that can be used in the same or other tasks.

## II. MANUFACTURING SYSTEMS REDESIGNING TOOLS

There are many redesign and improvement tools and methods that have been used to evaluate productive systems, helping production people to speed up the adjustment of changes, and make materials and information flows more agile [3], among those we found the following ones:

- Process mapping based on flow maps.
- IDEFO.
- GRAL.
- Material and information flows' modeling and simulation software.

Their characteristics have been evaluated and analyzed, but they have been founded to be too generic, they do not work so well to the modeling of manufacturing systems, do not give the value and importance to the numeric data as a manufacturing system requires since most of them are based on business processes and in the case of the last one mentioned the resources that it implies: training, time and effort (that at the end all of them translate to money), make it not so practical and not that used for most companies of any field and size, even the quantitative character of it, risk reduction and potential benefits that it could generate.

There are also 7 mapping tools that Hines and Rich study and present in terms of the seven wastes that are commonly accepted for the Toyota production system (overproduction, waiting, transport, inappropriate processing, unnecessary inventory, unnecessary motion, defects) [4].

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# Manufacturing Systems Redesign

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