A Review of new concept of production planning analysis and control systems in industry

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Abstract

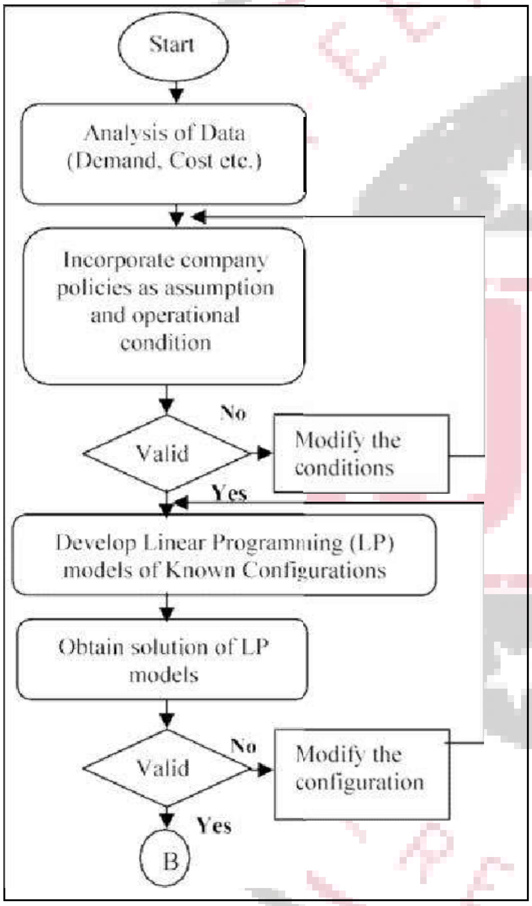
The process industries those firms that add value by mixing, separating, forming and/or chemical reactions by either batch or continuous mode continue to lag behind the discrete industries in the identification and implementation of effective production and inventory management (P& IM) techniques. A contributing factor is that the process industries have traditionally been lumped together and contrasted from the discrete industries as a whole, thus leading to misunderstandings regarding individual process industries. From site interviews and the literature, we identified four critical dimensions planning resource requirements (for materials and capacity), tracking resource consumption, control of work-in-process (WIP), and degree of computerization represented by seven variables by which to contrast and analyze process industries. Based on in-depth field studies of 19 diverse process plants, we find that there exist at least four distinct types of process industry P& IM systems: (1) simple, (2) common, (3) WIP controlled, and (4) computerized.

Keywords: Production and inventory management, Process industries, control system.

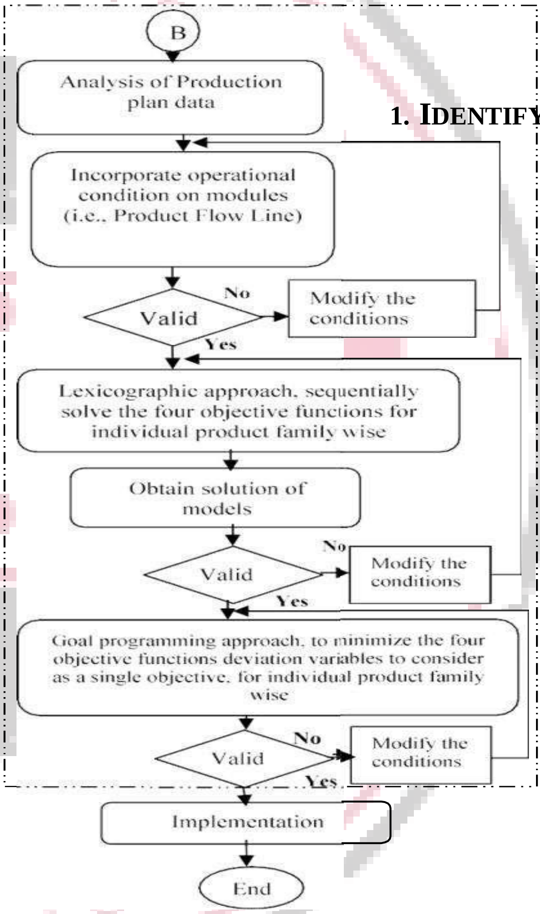
1. Introduction

Identifying the right kind of production and inventory management (P& IM) system for a manufacturing firm can be a difficult and complex task. Since the investment in a P& IM system is large and remains fixed over a considerable length of time, the correct system choice is critical to both a firm’s short and long-term profitability. Research on the selection and implementation of P& IM systems for different manufacturing environments has been extensive.[1] The majority of the research, however, has been for industries handling discrete units that are fabricated and/or assembled during manufacturing. This research has resulted in numerous successful developments in taxonomies, P& IM systems, and implementation strategies for the discrete industries. [2]

The process industries, consisting of firms that Aadd value by mixing, separating, forming and/or chemical reactions by either batch or continuous mode" [3], continue to have difficulty realizing the benefits of many of the management system developments in the discrete industries. A The process sector, although more automated than discrete industries at the process control level, lags discrete when it comes to overall manufacturing management systems tools" [4]. The reasons for this are many and varied. A brief review of past and current research sheds some light on the essence of this problem. [5]



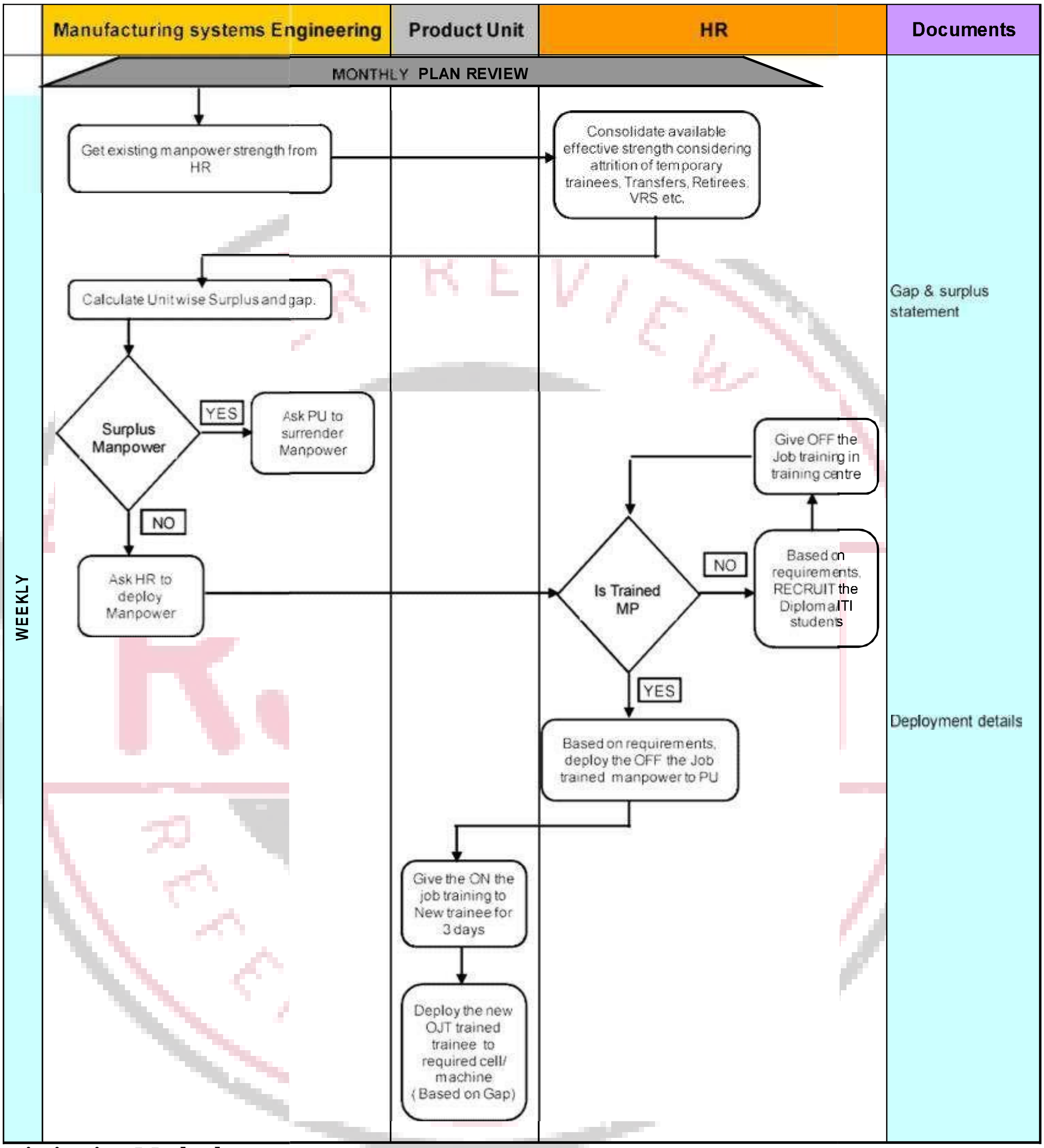
THE KEY IM



1. IDENTIFYING P&

2. Identifying the key P & IM system Variables

In order to effectively compare the P& IM systems, the characteristics that best differentiate between different P& IM systems had to be identified. The challenge was to isolate those characteristics that would provide a parsimonious yet thorough description of the sites' P& IM systems. Research suggests that this description must distinguish be- tween materials and capacity. Many researchers [6] recognize that the basic elements of any P& IM system include attention to both materials and capacity. [7] Expand on this by suggesting that P& IM systems may be classified by the primary resource that must be managed: materials, capacity, or a combination of both. Knowing which resource is primary provides valuable information about scheduling priorities and resource constraints. As such, the variables used in this research always considered materials and capacity separately. [8]



3. Optimization Methods

A related factor that can significantly add to the complexity in a remanufacturing shop is serial number specific reassembly operations. Any planning and control system used in a remanufacturing facility must be de- signed to coordinate the flow of material from disassembly with the reassembly of the unit. This coordination may be complicated when a unit is composed of serial number specific parts and components. [9] This requirement may be customer driven, e.g. where a customer turns in a unit to be remanufactured and then requests that same unit be returned to them. This requirement is common in heavy equipment (e.g., diesel engines) remanufacturing, or where there is a need to ensure system reliability of mechanical assemblies (e.g., jet aircraft engines). [10] A unit may also be composed of a mix of common parts and serial number specific parts and components. This mixture of common and serial number specific parts and components may be more prevalent with advances in modular design practices where components are common items, but the parts that make up these components are serial number specific. The presence of any serial number specific items makes coordination between disassembly and reassembly critical if customer due dates are to be met.[11]

Returned items must be disassembled before the product may be restored to full use. Disassembly operations have been examined extensively from an economic view; e.g., what degree of disassembly should be done. However, the effects of disassembly operations impact a large number of areas, including, production control, scheduling, shop floor control, and materials and resource planning. The disassembly and subsequent release of parts to the remanufacturing operations requires a high degree of coordination with reassembly to avoid high inventory levels or poor customer service. [12]

Demand management is an essential concern for a firm in a recoverable product environment since it is considerably more complex than in a traditional manufacturing environment. Since a firm engaged in remanufacturing may not operate in a closed-loop system the problem of balancing the return of products with the demand for products may be quite complex. This problem is known as the problem of imperfect correlation between demand and returns and has been addressed in earlier studies. This characteristic influences MPC design since obtaining the used products is a process subject to a great deal of uncertainty with respect to quantities and timing. [13]

Our work will focus on the effects of characteristics; the other problems are normally associated with reverse logistics activities and refer the interested reader to the paper by [14] for a complete discussion of reverse logistics issues. In the following discussion, we present an overview of the production planning and control problem for remanufacturers. Then, this topology is removed using this optimization material. Once again, this analysis is performed into a correction model to get pressure as well as error as well as improved values. [15]

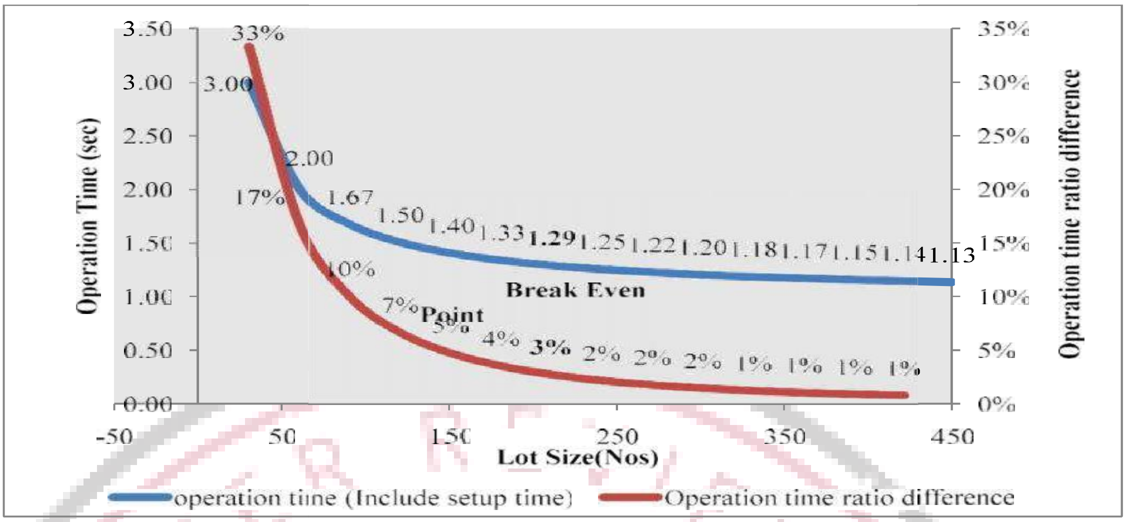


Fig.1 Graph between Lot size (Nos) and Operation time (see)

Conclusion

As stated in the Introduction, the goal of our research here was to identify dimensions that could discriminate between process industry P& IM systems, determine how these systems differ from one another, and identify major subgroups of such systems and their characteristics. An essential step required to accomplish this goal has been offered here: the detailed analysis and categorization of 19 process industry P& IM systems. Identified variables: materials requirements, materials and capacity consumption, WIP control, and degree of materials and capacity computerization. The categorization resulted in four distinct groups of P& IM systems: (1) common, (2) WIP-controlled, (3) computerized, and (4) simple. In summary, the categorization developed in this research study provides an improved understanding of process industries' P& IM systems. It is hoped that this understanding provide firms with an enhanced ability to share P& IM system accomplishments with other similar types of process firms and foster additional study in this critical and largely under-researched area.

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