

## Chapter 73

# Developments in Modern Operations Management and Cellular Manufacturing

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### ABSTRACT

*Operations management as a knowledge domain appears to be gaining position as a respected and dynamic academic discipline that is undergoing constant development. Therefore, from time to time it is sensible to monitor and analyze its developments by summarizing new features into comprehensive ideas. To support this necessity, the major publications/citations in this field and their evolving research utility over the decades are identified in this chapter. Because the goal of this book is to present the advancements in the area of operations management research, especially of advanced topics related to the layout design for cellular manufacturing, the second part of this chapter is focused on developments in cellular manufacturing approaches and methods by mapping literature sources during the last decade. Finally, the relationships between concept or/and tools in both areas that are empirically considered as consequences or coincidences are identified.*

### INTRODUCTION

Although the overviews of detailed historical developments in each cognition domain are useful, this survey will discuss modern eras of operations management and cellular manufacturing in a successive order.

Operations management (often called production management) may be defined in different ways depending upon one's attitude or point of view. Since this discipline is a field of management, it focuses on carefully managing processes to produce and distribute products faster, better and more cheaply than competitors. Operations management (OM) practically concerns all the

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operations within the organization and the objectives of its activities focus on the efficiency and effectiveness of processes. The modern history of production and operations management was initiated in the 1950s by the extensive development of operations research tools such as waiting line theories, decision theories, mathematical programming, scheduling techniques and other theories. However, the material covered in higher education was quite fragmented without the umbrella of what is called production and operations management (POM). Subsequently, the first publications ‘Analysis of Production Management’ by Bowman and Fetter (1957) and ‘Modern Production Management’ by Elwood Buffa (1961) represented an important transition from industrial engineering to operations management. Operations management finally appears to be gaining a position as a respected academic discipline. Thus, this may be a good time to update the evolution of the field. To achieve this goal, the major publications/citations in this field and their evolving research utility over the decades will also be identified in this chapter. Subsequently, opportunities and challenges of a modern operations management that managers were facing during the last decade will be examined.

Because the goal of this book is to present the advancements in the area of operations management, especially advance topics related to the layout design for manufacturing environments, the second part of this chapter focuses on developments in cellular manufacturing approaches and methods. A large body of literature has attracted a number of researchers to present different reports on the state of the art at different points in time. Several researchers have reviewed the literature and categorized the different methods. Our intention in this chapter is to analyze production-oriented cell formation methods based on the review mapping literature sources from 2000 to 2010.

Finally, in this chapter, we will note the relationships between concept or/and tools in both areas

that are empirically considered as consequences or coincidences.

## **OPERATIONS MANAGEMENT IN THE CONTEMPORARY ERA**

The process of building operations management theory and the definition of its scope or area has been treated by a number of authors. As mentioned above, the modern era of POM is closely connected with the history of industrial engineering (IE). The development of the IE discipline has been greatly influenced by the impact of operations research (Turner et al. 1993). Operations research (OR) was originally aimed at solving difficult war-related problems through the use of mathematics and other scientific branches. The diffusion of new mathematical models, statistics and algorithms to aid decision-making had a dramatic impact on industrial engineering development. Major industrial companies established operations research groups to help solve their problems. In the 1960s, expectations from OR were extremely high, and as was commented by Luss and Rosenwein (1997), “over the years it often appeared that the mathematics of OR became the goal rather the means to support solving real problems.” This caused OR groups in companies to be transferred to traditional organization units within companies. As a reaction to this disappointment Corbert and Van Wassenhove (1993) classified OR specialists into three classes: theoreticians, management consultants, who focus on using the available methods to solve practical problems, and the “in-between” specialists called operations engineers, who adapt and enhance methods and approaches in order to solve practical problems. The term “operations engineers” was formulated due to the lack of a better term and accordingly the group could also be referred to as operations managers and the field conducting applied research to help solve practical problems could be named production and operations management. In further developmental

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