Cost Engineering and Pricing in Autonomous Manufacturing Systems

Hamed Fazlollahtabar
Mohammad Saidi-Mehrabad

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Preface

Automation will substantially disrupt markets throughout the economy in the coming decade, ranging from construction to financial services. By understanding how technological changes will impact these markets, businesses can take advantage of the situation. Most importantly, buyers should be aware that those falling wages costs will help slow price growth in these markets, potentially providing the flexibility to delay purchasing decisions. Due to high tendency in employing high-tech machines and devices in industry and with respect to extensive consideration in automation, it is significant to investigate specific problems and challenges related to autonomous systems. However, such expensive systems require large amount of economic investment. Thus, identifying cost factors, analyzing them, and developing engineering paradigms for control and optimization need to be studied. Engineering design impacts whole-life cost of products produced. Understanding true cost of a product and the cost drivers during the design stage could guide the design process to obtain more competitive solutions. Cost engineering is concerned with cost estimation, cost control, business planning and management, profitability analysis, cost risk analysis and project management, planning, and scheduling. There are many different approaches and methods for estimating or assessing costs, all of which have advantages and disadvantages under particular circumstances. Cost estimating helps companies with decision making, cost management, and budgeting with respect to product development. It is the start of the cost management process. Cost estimates during the early stages of product development are crucial.

Also, to have more productive system and to obtain profit, appropriate pricing models should be developed to handle the operational costs in autonomous manufacturing systems. Price is one of the most flexible elements of the marketing mix, which interferes directly and in a short term over the profitability and cost effectiveness of a company. In fact, businesses can combat the destructive pricing environments that result from increased competition and globalization by implementing a more strategic pricing approach. This method provides businesses with the ability to maximize profit by providing visibility to pricing sensitivity – allowing you to maximize price in every transaction.

Therefore, both academicians and practitioners can find the book helpful. Graduate students can use the book as a course textbook or as further reading source. Industrial practitioners can learn significant concepts and applied models to be employed in real cases investigations and implementations.

Therefore, this book encompasses variety of topics in cost analysis for autonomous systems and pricing models. Different topics such as scheduling costing, agent-based costing, cost parameters of an advanced manufacturing system and operations planning with respect to cost management and cost minimization are considered in the book. Also, due to high competitive market and profit aspects, pricing concepts and models for autonomous manufacturing systems are developed. The models are novel and adapted based on autonomous manufacturing systems. Some of the distinct properties of the book are listed as follows:

- A pioneer book in cost engineering for autonomous systems.
- Introducing cost parameters, elements, and optimization models.
- Pricing models adapted for autonomous manufacturing.

This book covers several general and technical concepts involved in optimal decision making for manufacturing systems and also the use of autonomous systems as industrial automation for both researchers and executive managers. The book can be employed as a course book in graduate studies of industrial and systems engineering, operations management, logistics, etc.

Structure of the book and the materials in each chapter are further explained here.

In Chapter 1, an overview of the book and significance of the concepts considered in the book are given. In Chapter 2, the basics of costing and different cost models are explained within a scheduling problem in advanced manufacturing system. In Chapter 3, pricing models are discussed in detail and a case is investigated. Analytical studies on the performance of the pricing models in different conditions are also included. In Chapter 4, various cost parameters in manufacturing systems and costing models are reported and detailed in a case problem where specific data are extracted and a costing model is implemented. The impact of each cost parameter is also analyzed. In Chapter 5, cost minimization is discussed with respect to engineering paradigm in product design and manufacturing planning. In Chapter 6, cost/price interaction for profit modeling is handled. Profit maximization is a common goal of manufacturing needing to consider both cost and price at the same time. In Chapter 7, pricing model for advanced systems is detailed and implemented for a specific system. In Chapter 8, price optimization with respect to costs is modeled for an advanced manufacturing system. The model considers a comprehensive set of parameters and provides a generic framework for other systems.

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