PERFORMANCE EVALUATION OF LEADING FABLESS INTEGRATED CIRCUIT DESIGN HOUSES BY USING A MULTIPLE OBJECTIVE PROGRAMMING BASED DATA ENVELOPMENT ANALYSIS APPROACH

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ABSTRACT. The fabless integrated circuit (IC) design is one of the most important sectors of the semiconductor industry. In 2010, the total revenue of the fabless IC design sector had already hit US$59.6 billion, accounting for one-fifth of the total semiconductor industry revenue. Thus, understanding the efficiency of fabless IC design houses is critical not only for managers of fabless IC design houses, but semiconductor foundries and investors as well. However, very few researches have tried to benchmark fabless IC design houses. Most existing researches have focused on benchmarking the fabless IC design houses within a particular geographic area, such as Taiwan. Further, very few of the researches that tried to benchmark the world’s leading fabless IC design houses introduced the traditional CCR or BCC Data Envelopment Analysis (DEA) models based on improper weight derivations. Such performance evaluation results were derived based on different bases of comparisons of decision-making units (DMUs). Therefore, the purpose of this paper is to evaluate the efficiency of the world’s leading fabless IC design houses by introducing a new and reasonable Multiple Objectives Programming (MOP)-based DEA method with derivations of the efficiency achievement measure (EAM). The performance of the world’s top forty fabless IC design houses will be evaluated. According to the analytic results, the strength and weakness of IC design houses can be demonstrated and strategies for enhancing the houses can be proposed. In the future, the proposed MOP-based DEA method can serve as an appropriate method for performance evaluations.

Keywords: Data envelopment analysis (DEA), Fabless IC design house, Multiple objectives programming/efficiency achievement measure (MOP/EAM), Semiconductor industry

1. Introduction. The notion of performance is a recurrent theme in most branches of management both to academic scholars and practicing managers [1], while the measurement of a firm’s productivity efficiency, the multiplication of the technical efficiency and the price efficiency [2] are regarded as some of the most important tasks for managers. Performance evaluation and competitive advantage concern question of how to create the businesses in which a company competes [3,4]. It is important to create superior performance with strategies that are optimized for adaptation (adjusting to differences),