PATTERNS OF HORIZONTAL COLLABORATION FOR TOTAL SOLUTION SERVICE PROVISION IN THE IC DESIGN INDUSTRY

YEA-HUEY SU
Assistant Professor
Department of Information Management
National Central University
No. 300, Chung-Da Rd., Chung-Li, 320, Taiwan
Tel: +886-3-4267260, Fax: +886-3-4254604
suesu@mgt.ncu.edu.tw

YU-SHAN CHANG
Lawyer
Lin & Shih Attorneys at Law
5th Fl., No. 9, Ln. 6, Sec. 1, Hang-Jou S. Rd., Taipei, 100, Taiwan
Tel: +886-2-33225678, Fax: +886-2-33221199
yushan@linshih.com.tw

RUEY-SHAN GUO
Professor
Department of Industrial Management and Business Administration
National Taiwan University
No. 1, Sec. 4, Roosevelt Rd., Taipei, 106, Taiwan
Tel: +886-2-23630231 x 2957, Fax: +886-2-23629122
rsguo@ccms.ntu.edu.tw

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ABSTRACT

With the advances in semiconductor manufacturing technology and the trend of "system on a chip" or "system in package," intellectual property (IP), which is reusable IC design component, has become an important concept in IC design industry. Since 90s, IC design industry has gradually disintegrated into three major businesses: IC product design, IP component, and design service. Because IC design and manufacturing complexities continue to increase significantly, designers are facing increased time-to-market pressure and more expensive mask cost to rapidly introduce new products with limited life cycle, which shortens the time available for research and development. It is becoming less practical for an IC design house to internally develop all components and tools without depending on solutions provided by their third parties, called as third-party IP providers, including design service provider, stand-alone IP provider, and EDA tool provider. However, it is very time-consumed in both IP transaction process and the process for integration of various IPs into an IC. Although IP was expected to be synthesizable with seamless integration into IC designs, IC design houses would not be able to license IP based on the requirements of specific designs because IP available from third-parties is often incomplete of alternatively fine-tuned for specific wafer processes. Since most IP providers have different IP technology and core competences, more and more IP providers start to collaborate with one another in order to obtain complementary resources or abilities to provide complete IC design solutions to customers. A trend of "horizontal collaboration" has been happening. The goal of this research is then to explore how each IP provider collaborates with one another under the new business paradigm.

Seventeen IP providers were first selected as the sample companies and classified into four patterns of business models, which include (1) IP vendors who provide Star-IP or specialized techniques, (2) IP vendors who provide IP components with multiple functions, (3) IP vendors who provide EDA tools as their core business, and (4) IP vendors who provide design service and turnkey service as their core businesses. Within the four patterns of business models, five representative IP providers are further chosen as the focus of case study and in-depth interviews were conducted within these five companies. Through interviews and information collection of these five companies, we found that the most common horizontal collaboration model in IP industry is the collaboration between two companies to

provide a complete solution to customers with different patterns (IP solution partner, IP promotion partner, design methodology solution partner, or design service solution partner) by combining complementary IP services such as EDA tools, core IP technology and design service.

Keywords: Silicon Intellectual Property (IP), Horizontal Collaboration, Total Solution Service,