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ASSET-LIGHT BUSINESS MODEL: A THEORETICAL FRAMEWORK FOR SUSTAINED COMPETITIVE ADVANTAGE

Fen-May Liou*, Ying-Chan Tang** and Chih-Pin Huang***

This paper aims at exploring how the inference “sustainable competitive advantage-generates- superior performance” can be put into practice. We introduce a theoretical framework: the asset-light business model to examine the relationship between the competitive advantage and resource heterogeneity. Four generic dimensions of strategic resources are suggested. They are customer relationships, supplier relationships, knowledge property, and fixed asset management, each of which is connected to their corresponding financial initiatives based on du Pont identity. The theoretical framework was applied to global semiconductor industry. We successfully demonstrate that the asset-light business model is useful for practitioners to identify the effective source configurations of the competitive advantage.

Field Research: Strategic Management

1. Introduction

The theories of industrial organization and strategic management describe necessary conditions for firms to obtain a sustainable competitive advantage, and suggest appropriate strategies for corporations to obtain superior financial performance (Barney, 1991; Grant, 1991; Porter, 1991). The fundamental question of such theories (such as

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the resource-based view) is the utility in developing meaningful management tools and actionable strategies for their practitioners (Mahoney and Pandian, 1992; Oliver, 1997; Peteraf, 1993; Wernerfelt, 1984). Despite the rapid diffusion throughout the strategy and marketing literature, the resource-based view is challenged against its unconvincing theoretical structure for unidentified boundaries, using all-inclusive classification of resources, and being unclear on how the inference “sustainable competitive advantage generates superior performance” can be comprehended (Priem and Butler, 2001a). Dispute over the resource-based view’s “analytical” statement (“If a resource is valuable and rare, then it can be a source of competitive advantage”) rests on two tautologies: (1) the antecedent (“source of competitive advantage”) and consequent (“valuable, inimitable, and nonsubstitutable”) are defined in the same terms, so the resource-based theory is not falsifiable; (2) the cause of competitive advantage (resource of competitive advantage) is the consequence (to sustain competitive advantage), which in turn is the cause (source is not imitable, transferable, or substitutable by competitors) – a circular reasoning without “empirical evidence.” (Arend, 2003; Barney, 2001; Durand, 2002; Priem and Butler, 2001b).

To resolve these refutations, Powell (2001) suggested changing the competitive advantage proposition from its traditional deterministic form (“sustainable competitive advantages *create* (or *cause*) sustained superior performance”) to a probabilistic inference: “sustainable competitive advantage is more *probable* in firms that have already achieved sustained superior performance”. In this guise, the proposition does not assert that effects (evidence of superior performance) follow directly from causes (competitive advantages). Rather, one infers that a cause exists by observing a *relationship* between effects: the level of performance and the presence or absence of competitive advantage. By introducing the concept of *competitive disadvantage*, “an essential missing ingredient in theoretical and empirical work on competitive advantage (Powell, 2001:881),” it can be shown that dispute over the deterministic proposition ‘q implies p’ (“competitive advantage” implies “superior performance”) is only partially justified. Since the word “*competitive*” is a relative concept, the definition of “competitive advantage” is on a comparative basis. The inductive inference of sustained competitive advantage demands a deeper investigation of the sources (causes) of competitive advantage and the valuation (effect) of sustained superior performance. Tang and Liou (2007) applied Bayesian Epistemology to advance Powell’s idea by proposing that resource heterogeneity and organizational configurations mediate between competitive advantage

and a firm's performance.

In the present study we introduce the asset-light business model (A-L model) to describe resource heterogeneity of firms. The return on invested capital (ROIC) represents the observable competitive advantage of a firm, while the firm's performances are measured by the accounting items in the du Pont identity. Four groups of firm resources are identified to form the four dimensions of the A-L model. The model is applied to the global semiconductor industry. The top and bottom ranked firms of this analysis provide evidence for which resource configurations are most effective in their industry. This paper concludes with a summary and suggestions for future research.

2. Literature Review: Developing the Asset-Light Business Model

The A-L model refers to a business strategy that pursues capital efficiency by focusing the equity investment on those assets where a company's expertise attains the best return for investors (Maly and Palter, 2002, p. 1). The core of the asset-light approach is to enhance the firm's long-term value through enlarging valuable and unique firm resources. The fundamental question of operational strategic management is this: what kinds of data can be taken to identify and measure the heterogeneous strategic resources? Financial statements can provide a good measurement of competitive advantage for three reasons: (1) as a company must set priorities and decide what resources to deploy (Aaker, 1989), financial statements reflect those strategic choices which may contribute to competitive advantage; (2) financial statements record current activities and the subsequent profitability, which is rewarded from past actions (i.e. resource deployment) that influence advantages of the firm (Day and Wensley, 1988); and (3) the balance sheet and income statement demonstrate how well the source configuration, including physical assets, human resources, and marketing expenditures, is consolidated and utilized.

To ensure commensurability among firms, financial analysis is usually conducted on the basis of ratios. As there are more than one hundred financial ratios in common use, we need a systematic approach to identify those financial ratios that appropriately reflect the firm's strategic choices. The du Pont identity is often used as a managerial tool to quantify the factors driving financial return and assess the operating strengths or weaknesses of a firm (Grant, 1991; Firer, 1999). Return on invested capital, or ROIC, is often used to assess the value of a firm's value creation capabilities. It measures how

effectively a company has generated cash flow by deploying its invested capital. ROIC is calculated as the net operating profits less adjusted taxes (NOPLAT), divided by invested capital (IC):

$$ROIC = \frac{NOPLAT}{IC} = \frac{NOPLAT}{S} \times \frac{S}{IC} = NOPM \times Capital\ Turnover \quad (1)$$

where $NOPLAT = EBIT \times (1 - t)$; $EBIT$ = earnings before interest and tax; S = sales; $NOPM$ = net operating profit margin; and IC = (Fixed Assets + Current assets) – non-interest-bearing liabilities.

$NOPM$ represents the profits related to sales generated or improved operating efficiency, while capital turnover measures the efficiency of capital use. The du Pont identity states that profitability can be obtained from both operating efficiency ($NOPM$) and effective use of capital ($Capital\ Turnover$). $NOPM$ can be expressed in dimensionless terms as follows:

$$NOPM = \frac{(p - c) \times q}{p \times q} = \frac{(p - c)}{p} = 1 - (c / p), \quad (2)$$

where p = sale price, c = unit cost per sale volume, and q = sale volume.

Peteraf and Barney (2003) defines competitive advantage in terms of the economic value created, which is willingness to pay minus costs (per unit) times quantity, i.e., $V = (WTP - C) \times Q$. Equation (2) accords to the economic definition of competitive advantage. This relation implies that operating efficiency (profit margin) can be obtained by either of the following two strategies (Porter, 1991): (1) setting a high price level through product differentiation or a high resource-produced value (i.e., brands or new technologies/products); or (2) a low unit cost, which may be due to a cost-leading strategy or to low relative response costs (low cost of goods sold or asset depreciation). Referring to Equation (3), we also note that the effect of operating efficiency on profit can be enlarged by the effective use of capital.

In order to observe the strategic choices of a firm in detail, the drivers NOPM and Capital Return can be further decomposed into several related financial ratios as follows:

$$ROIC = \frac{NOPLAT}{S} \times \frac{S}{IC} = \frac{(S - CGS - R \& D - Dep - SG \& A - Tax) / S}{(FA + AR + Inv - AP + Cash) / S}, \quad (3)$$

where *CGS* = cost of goods sold; *R&D* = expenditures on research and development; *Dep* = depreciation; *SG&A* = selling, general and administration expenses; *FA* = fixed assets; *AR* = accounts receivable; *Inv* = inventory; and *AP* = accounts payable.

The numerator of ROIC (operating efficiency) includes the unit costs per dollar sale of various operating activities: (i) production, (ii) research and development, and (iii) selling, general, and administration. The denominator (effective use of capital) comprises various reversed asset turnover ratios including the firm's capabilities in managing tangible entities (fixed assets), its relationships with customers (accounts receivable turnover), and its negotiation power with suppliers (accounts payable and inventory turnover).

The relationships between those financial ratios specified in equations (1), (2), and (3) and the strategic choices utilizing those configurations are presented in Figure 1. These ratios can all be used to examine the features of strategic groups (e.g. Harrigan, 1985; Brown, Soybel, and Stickney, 1994). This hierarchical model posits the following causal sequence of strategic management: competitive advantage → unique source configuration → distinct management abilities → superior financial performance.

3. Methodology

As discussed above, the heterogeneity of the firms' rare and valuable resources can be inferred from performance data. Factor analysis based on principle component method was used to infer the heterogeneity with source configuration. We apply the A-L model to the worldwide semiconductor industry during the period 2000-2005. There are 208 global semiconductor companies (classified as SIC #3674), contributing a total of 1,248 observations to the Standard and Poor's COMPUSTAT database in the fiscal years between 2000 and 2005 inclusive. Sixty-one companies were excluded from our dataset for one of the following reasons: (1) 10 had less than 3 years of data; (2) 10 were outliers, in the sense that one of their financial indicators was more than three standard deviations

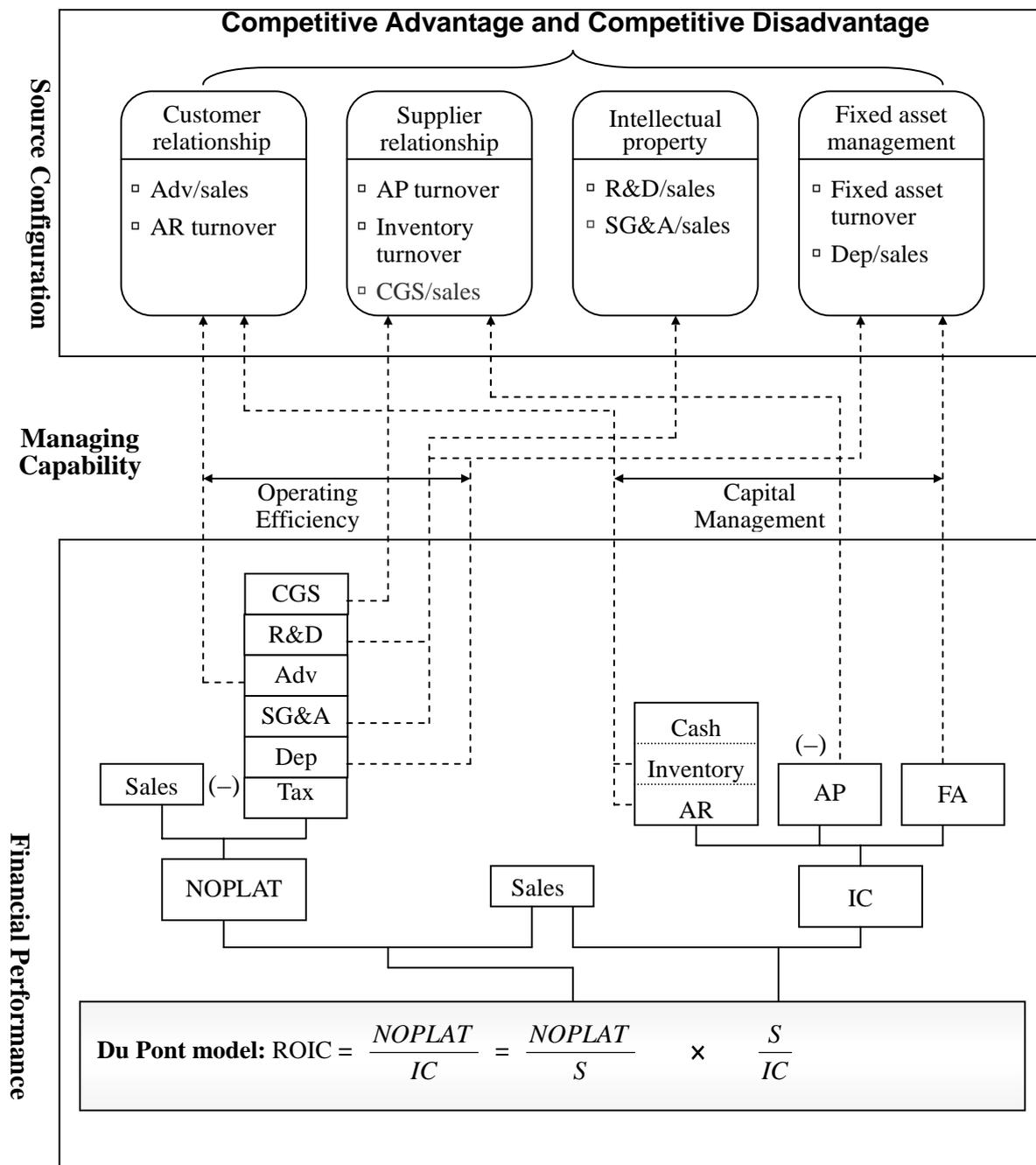


Figure 1. Competitive advantages and their associated financial ratios

Adv- advertising expenses; AR- accounts receivable; AP- accounts payable; CGS- cost of sales; Dep- depreciation and amortization; FA- fixed assets; IC- invested capital; NOPLAT- net profit less adjusted tax; R&D- research and development expenses; ROIC- return on invested capital; SG&A- selling, general and administration expenses.

away from the industry mean (Walsh, Craig and Clarke, 1991); and (3) 41 lacked clear and complete reports on the various expenditure components (R&D, SG&A, CGS, Dep., and Tax). These exclusions resulted in a dataset containing 147 companies and 786 firm-year observations. Among the 147 companies, 118 are located in developed countries (the US, Europe, and Japan). The other 29 are in the Asia/Pacific region.

A principle component analysis was conducted to identify underlying source configurations correlated with the diverse financial performance evident in the 786 observations. After applying a varimax rotation and the eigenvalue (>1) criterion, we identified three factors that account for 60% of the total variance. Table 1 shows these three source configurations and their associated financial indicator loadings, with the significant loadings (0.55 and above) highlighted in bold.

In Factor 1, the significant indicators are all related to *relationship management*. This includes customer relationship management (accounts receivable turnover) and three variables related to supplier relationship management (accounts payable turnover, inventory turnover, and CGS/sales). Thus, this factor illustrates the competitive advantage of firms that skillfully manage their upstream (suppliers) and downstream (customers) relationships. There is also a negative correlation between CGS/sales and Factor 1 (-0.677), indicating that good relationship management can pay off with respect to a lower cost of goods sold. The semiconductor/IC industry has developed several partitions over the years, with firms dealing in intellectual property (NXP and IBM), integrated circuit design (Qualcomm and NVIDIA), wafer foundry (TSMC), and IC assembly (Advanced Semiconductor Engineering). From the industry perspective, the form of Factor 1 indicates that all these firms are highly interdependent—each firm has to ally with both upstream and downstream members.

Factor 2 consists of indicators related to a firm's *fixed asset managing capability*, including depreciation/sales ratio and fixed assets turnover. The negative correlation between fixed assets turnover and Factor 2 (-0.793) indicates firms exhibiting greater competence in assets management require less unit historical cost to generate more revenue. It is imperative in the semiconductor industry that firms must fully utilize fixed assets in a short period of time. The high correlation between depreciation/sales and Factor 2 (0.870) unveils another unique feature of this capital- and equipment-intensive industry. This result underlines the importance of "light" asset operation in the semiconductor industry.

Factor 3 consists of indicators related to *knowledge management*, including R&D/sales

and SG&A/sales. Both ratios measure a firm's effectiveness in resource deployment. The high correlations between Factor 3 and R&D/sales (0.859) and SG&A/sales (0.812) indicate that lower unit costs are associated with efficient management.

Principal component analysis thus confirms our proposition that the source configuration and management ability of firms can be inferred from their financial indicators. We will the asset-light model in the following section.

Table 1. Principal component analysis

Financial Indicators	Source Configuration		
	Factor1: Relationship Advantage	Factor2: Management Ability	Factor3: Knowledge Management
Accounts receivable turnover	<u>0.578</u>	- 0.085	0.338
CGS/sales	<u>- 0.677</u>	- 0.204	- 0.417
Inventory turnover	<u>0.595</u>	0.053	- 0.033
Accounts payable turnover	<u>0.684</u>	0.008	0.043
R&D/sales	0.238	0.046	<u>0.859</u>
SG&A/sales	- 0.063	- 0.184	<u>0.812</u>
Depreciation/sales	0.034	<u>0.870</u>	0.014
TA/sales	<u>0.568</u>	- 0.229	- 0.379
Fixed assets turnover	0.017	<u>- 0.793</u>	0.101
Eigenvalue	2.36	1.56	1.45
Accumulated variance (%)	0.26	0.43	0.60

4. Discussion of Findings: Segregating Competitive Advantage and Competitive Disadvantage

In order to infer sustained competitive advantage, we must investigate the sources of competitive advantage and the valuation of sustained superior performance at a deeper level. We follow Hunt (2002) and Priem and Butler (2001b) in restricting competitive advantage to firms whose financial performance are superior to the industrial average. Companies with a high ROIC typically attract competition, so this ratio is taken as the appropriate indicator of financial performance. Furthermore, companies that have built up a *sustained* competitive advantage should generate a consistent or increasing ROIC over

a long period of time. Thus, only firms having a three-year average ROIC above the industrial level are so classified.

Table 2 ranks the top and bottom five semiconductor firms in terms of ROIC and lists their resource-related financial ratios during 2003-2005. The IC design houses Novatek Microelectronics (Taiwan), Mtekvision (Korea), and Sitronix Technology (Taiwan) command the highest ROICs in the industry. Two indicators confirm the existence of competitive advantage in these companies: (1) they have both high fixed assets turnover and low accounts payable turnover, indicating an ability to parlay their unique technologies into cost-effective design and manufacturing processes; and (2) their SG&A and R&D expenditures are low relative to sales, indicating effective knowledge management. All three high-return companies also operate on a rather small scale (i.e., “light” assets), in terms of their total assets compared to the industrial average.

Among the bottom five firms, Memc Electronic Materials and Melexis Nv (both based in USA) show disadvantages despite that they have low unit cost of goods per sale than their rivals, which indicates a strong bargaining power over their suppliers. The disadvantage shows that: (1) they both have low fixed asset turnover ratio and high depreciation level, indicating a “heavy” asset structure; and (2) their accounts payable turnover is high, denoting that they little utilize their suppliers’ capacities.

The last three rows in Table 2 present the average financial ratios of semiconductor firms based in Asian emerging countries (the Asian group), the advanced economic regions (the advanced group) and the industrial average. The Asian group outperforms the advanced group with respect to average ROIC. The main source of the difference is that the Asian group has lower R&D and SG&A expenditures relative to sales (knowledge management) than the advanced group. The evidence reveals that in average, Asian semiconductor manufacturers generate advantage from cost-down strategies. Furthermore, the Asian group has lower depreciation to sales ratio, indicating a lighter asset structure than the advanced group.

5. Conclusion

The major contribution of this study is its new theoretical framework, which can be used to infer competitive advantage from resource heterogeneity. We applied the A-L model to the global semiconductor industry. The principle component analysis substantiates our model. Since financial data is easy to access, this theoretical framework may be useful for investigating the relative market positions of firms in a given industry. However, the

indicator presenting competitive advantage in this paper, the ROIC, reflects only the “realized” competitive advantage. It does not apply to identify the “unrealized” (or “potential”) competitive advantage. For instance, a pharmaceutical company has low net income, thereby a low ROIC, due to the large expenditures in R&D for a new drug. There are two possible outcomes: the company realizes the competitive advantage after it successfully introduces the new drug into the market; or the company fails to introduce the new drug and the competitive advantage is never realized. Obviously, the unrealized potential competitive advantage is associated with risks. This will be a theme for future researches.

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Table 2. The top five and bottom five semiconductor firms during 2003-2005 ranked by ROIC

Company	Area	ROIC	TA	ART	CGS/S	APT	INVT	R&D/S	SG&A/S	FAT	Dep/S	Tax/S
The top five competitive advantage companies												
Novatek Microelectronics	Taiwan	0.45	426	4.19	0.70	6.08	11.60	0.05	0.04	31.08	0.005	0.000
Mtekvision	Korea	0.42	98	9.10	0.66	8.75	8.60	0.07	0.02	20.93	0.004	0.003
Memc Electronic Matrials	USA	0.38	962	7.91	0.63	9.00	8.14	0.04	0.07	2.48	0.044	0.002
Sitronix Technology	Taiwan	0.37	54	4.82	0.65	11.78	8.89	0.09	0.05	20.35	0.004	0.014
Melexis Nv	USA	0.31	151	4.91	0.52	29.82	5.64	0.14	0.07	4.20	0.074	0.030
The bottom five competitive disadvantage companies												
Spectrum Signal Processing	UK	-0.33	9	4.53	0.41	10.38	9.86	0.20	0.43	12.29	0.041	0.000
Anadigics Inc.	UK	-0.33	187	6.83	0.69	8.76	6.79	0.36	0.23	2.16	0.171	(0.002)
Centillium Communications	USA	-0.37	95	11.31	0.46	14.08	14.42	0.50	0.25	16.46	0.057	0.002
IQE Plc	USA	-0.37	52	6.57	1.01	5.20	4.91	0.06	0.31	1.90	0.111	0.000
Imagination Technologies Group	Canada	-0.43	48	7.70	0.37	8.36	12.98	0.58	0.17	7.97	0.047	(0.011)
Sources of Competitive Advantage by Regions												
Asian Emerging Countries		0.12	2,464	5.78	0.59	11.43	8.72	0.07	0.07	5.89	0.142	0.00
USA, Europe and Japan		0.03	2,189	6.39	0.55	12.83	8.49	0.16	0.16	5.65	0.081	0.020
Industry average		0.04	2,243	6.27	0.56	12.55	8.53	0.14	0.15	5.69	0.090	0.019

ROIC: return on invested capital; ART: accounts receivable turnover ratio; CGS: Cost of goods sold; S: annual sales; APT: accounts payable turnover ratio; INVT: inventory turnover ratio; SG&A: selling, general and administration expenditure; FAT: fixed assets turnover ratio; TA: total assets in million US dollars.