Chapter 4

A Dynamic Model of Organizational Profitability

Why Do the Firms Seek Emerging Technological Know-how?

Abstract: The conventional wisdom suggests that the Japanese firms are averse to taking risks, but their behavior is highly future oriented. American firms, in contrast, seek high profits over a short-term horizon. American approach is characterized by high volatility in returns over a long-term for each organization, in so much that the firms often need to carry substantial slack capacity for insuring any survival-threatening downturns at any instant. American firms seek to sustain their unit returns by acquiring dynamic resources from the emerging markets. Japanese firms, who rely on both American as well as independent services, develop an advantageous position for adding value through trade even without any visible profits. The model highlights the forces in rising profits and slowing growth of the Japanese firms over the recent years.

Introduction

The forces motivating the organizational behavior have long been a focus of academic investigation. In a classic study on the motivators of human behavior, Maslow (1970: 38) found "The physiological needs, along with their partial goals, when chronically gratified cease to exist as active determinants or organizers of behavior. They now exist only in a potential fashion in the sense that they may emerge again to dominate the organism if they are thwarted. But a want that is satisfied is no longer a want. The organism is dominated and its behavior organized only by unsatisfied [higher order] needs." As for a firm, the guiding heuristic is to develop links between the organization and the market through research, administrative services, and marketing (for example, gross profit). The heuristic targets the ability to finance firm-specific investments (for example, profit before interest, depreciation and tax). It compensates the stakeholders beyond the normal tax-deductible operating proficiency (for example, profit after tax).

Western firms typically make substantial commitments into research, administrative services, and marketing, during the early growth stage. Once the firm-specific intellectual property is in place, they operate the dominant businesses as mature cash cows from which the additional investments could be financed. These additional investments are financed through the new stock issues to potential investors, and to workforce as an added incentive over the cash compensation. The lower cash costs of the workforce insure higher gross profitability. Over time, the decreasing costs of research, administrative services, and marketing, contribute to the profit before interest, depreciation and tax. Further the lower interest costs augment the profit after tax, albeit at a decreasing rate since the reduced cost also implies lower tax deductibility. Thus, there is a constant motivation to search the emerging domains for expanding business.

Japanese firms, in contrast, traditionally sustained poor profit after tax performance, and a super-normal pre-emptive debt-financed investment. The escalating costs of workforce, as the employees gained experience within the firm, implied limited gross profits. The ability of the firms to bear research, administrative and marketing expenses, was quite poor. Under these conditions, the reliance on the outside vendors for the innovative material inputs and creative technical services was the dominant solution to sustained organizational growth, or even survival. In an early study, Abegglen (1958: 13) highlighted the prominence of seniority-based lifetime employment and group-work in Japanese manufacturing operations, and concluded, "productivity in Japan is below the American average. This low productivity is a result in large part of the different social organizations; and Western-inspired technological changes can have only a limited effect on the productivity level and, indeed, can in some respects only aggravate the problem." During the late 1950s and early 1960s, Japan enjoyed a rapid growth in the productivity levels. Cole (1971) found that Japanese system had become a 'functional equivalent' of the American one, albeit with some inefficiencies. Drucker (1971) commented that despite inherent system-level problems, several distinctive principles could be used

beneficially by even the most innovative of American firms. These principles included consensus decision making, lifetime employment, continuous training, and the godfather system.

In a grassroots level analysis, Dore (1973) offered historical background to these principles, and suggested that the Japanese firms sat up a cooperative labor-management regime subsequent to the violent strikes immediately after the War. He identified this regime to be a pre-emptive response to the adversarial market-based industrial relations of the UK, and concluded that the late development of Japan facilitated learning from the problematic experiences of the early Anglo-Saxon movers. Clark (1979) made an influential case for the performance edge of the Japanese operating and financial regime. Group orientation was commended for a sense of community, in which the employees are the members of the organization sharing common fate, and not just contractual workers focused on their own personal interests. Paternalism, far from being an inertial legacy of the feudalism as held out by the early investigators, was noted for fostering a long-term orientation that generated growth by helping to retain the members within the organization. In effect, these characteristics encouraged the new employees of the Japanese firms to accept lower than the market compensation, in expectation of receiving super-normal compensation in future once they gain seniority and the organization grows to be more profitable.

Using an extensive survey of the IBM employees in 53 nations, Hofstede (1980: 373) concluded, "the stability of national cultures over long periods of history is achieved through a system of constant reinforcement, because societal norms lead to particular political, organizational, and intellectual structures and processes, and these in turn lead to self-fulfilling prophecies in people's perceptions of reality, which reinforce the societal norms… In the management literature there are numerous unquestioning extrapolations of organizational solutions beyond the border of the country in which they were developed. This is especially true for the exportation of management theories from the United States to the rest of the world, for which the non-US importers are at least as responsible as the US exporters." The studies, such as

those by Schonberger (1982), revealed the contribution of American thought to the high-performance Japanese techniques such as just-in-time, quality circles, and suggestion schemes. More recently, Koike (1988) highlighted the value of extensive job rotation in creating a flexible, general-purpose, problem-solving intellectual capability among the Japanese employees.

The sustained domestic recession experienced by Japan since 1990 suggests a need to review the conventional analysis. Japanese subsidiaries overseas are typically not organized by the seniority system. The worker compensation is rarely based on the firm-specific experiences, and a significant reliance is laid on exploiting the specialized market services for correcting the technical limitations of the transplants. The learning acquired in the overseas markets rapidly feeds back to the parent headquarters in Japan, through the rotation of Japanese expatriates who act as the core top management team in most overseas subsidiaries. On the whole, Japanese firms are enjoying a super-normal international growth on a constant base of Japanese employees. Without a commensurate rise in the administrative and marketing costs, several Japanese firms are flush with significant cash reserves. These cash reserves have been built from the super-normal profits, especially in the transplants across the emerging markets, where the Japanese firms negotiated tax holidays by leveraging upon similar deals in the advanced Western markets. At the same time, strong risks of making these gains visible discourage re-investments.

Thus, the firms generate super-normal profits without investing in organic growth due to the (1) Diminishing costs of capital, deriving from a lower cost of overseas manpower, and (2) Increasing returns on marketing, deriving from the diffusion of costlier local services overseas. This report evaluates the evidence on the first, and recommends the second for further research.

Why is the Global Market Manpower More Cost-effective?

The higher per capita income levels are a dominating factor in the cost-effectiveness of the global market manpower. The human capital embodied into the material inputs, usually traded from the emerging markets at commodity prices, play a deciding role in the sustained leadership position

of the industrialized nations. The firms in the industrial markets consequentially enjoy super-normal rents. The governments of the industrial nations use the super-normal cash reserves accumulated by their domestic firms as a base to generate credit for supporting the dedicated purchases by the international community. This credit, which takes virtually zero cost to create, is offered on liberal terms below the market rate of interest. The burst of the East Asian miracle, soon after the Japanese firms became the principal lenders in the regional markets, is illustrative. The subsequent unilateral outflow of funds from the emerging markets devalued the local currencies, and augmented the worldwide purchasing power to acquire local assets.

Historically, in manpower-intensive operations, such as auto assembly, American firms pursued a worldwide strategy. In a public document, General Motors (1966) stated that, "General Motors holds that unified ownership for coordinated policy control of all its operations throughout the world is essential for its effective performance as a world-wide competitor." Table 4.1 shows that, after the auto assembly firms established wholly owned subsidiaries over the 1920s, there was an increased American reliance on the joint ventures with the local partners.

Table 4.1: Historical Trends in the American Ownership of New Foreign Subsidiaries

	Wholly owned	Minority owned
1900-1909	73.8%	1.6%
1920-1929	78.42%	13.8%
1940-1949	62.5%	27.7%
1960-1967	55.3%	26.3%

Note: Excluding subsidiaries in Japan, Spain, Mexico, India, Pakistan, and Sri Lanka, where minority ownership was government regulated. Source: Stopford and Wells (1972).

To illustrate, the technically sophisticated American chemical firms sought to develop links with the local partners, for keeping up with the latest marketing know-how. Further 80-100% of the American overseas manufacturing in the material-intensive sectors was collaborative, with local partners renowned for the innovative portfolio of technologies in mining and material processing. On similar lines, in sectors co-specialized with the auto assembly, such as fabricated metals, non-electrical machinery, and other iron and steel products, Japanese trading

firms actively prospected the specialized vendors from the emerging markets. As such, once the ex-colonies gained independence, the European firms experienced a growing disadvantage in acquiring the raw materials and know-how related to the newly emerging technology segments. The largest twenty seven of the European electrical and chemical firms consequently mobilized joint finance from the business families, home bank and government institutions, and established seven or more manufacturing subsidiaries internationally. European subsidiaries, especially those in the US, typically had a more diversified product portfolio than the parent firms. The diversity derived primarily from the new product innovations. 53% of the 85 Continental European firms manufacturing in seven or more countries were in the three most R&D intensive industries, compared to just 44% of the 187 American multinationals (Franko, 1976). The transfer of the worldwide know-how back home made European parents in the new industries far more diversified than the comparable American multinationals. These parents typically diffused all new know-how to the overseas subsidiaries for initial commercialization, and then set up full-fledged manufacturing operations within Europe using the relevant complementary linkages worldwide. The subsidiary presidents were encouraged to report on all the new product ideas directly to the parent president. Over time, the heads of subsidiary functions, such as for the production, research, sales, and finance, were also involved in the direct reporting to the parent president. The stringent tariff laws of the European nations made the mass imports of material inputs from the international markets quite cost escalating. Under these conditions, a diverse group of innovative American suppliers, from auto assembly related industries such as iron and steel, paints, non-ferrous smelting, and industrial chemicals, set up dedicated local operations in each nation. The resulting products, enriched with the diverse emerging market know-how, could be cost-effectively marketed at premium values even in the US.

Hypothesis Formulation

The strengthening fundamentals of the European assemblers bore incredible risks for the Japanese firms. In the late 1970s, several prominent Japanese assemblers faced a state of near bankruptcy. The lead stockholders of Mazda approached Ford for taking a 25% equity share for cash. Mazda had a 2600-strong dealer network, which carried bloated inventories and high debt burdens. Under the leadership and financial expertise of Ford, Mazda revolutionized the Japanese distribution landscape by pioneering American-style car showrooms. These showrooms displayed latest Ford brand vehicles imported directly from the US. The appreciating fundamentals of the US dollar ensured that all the potential customers attracted by the hot publicity decided on buying the home made Mazda brand vehicles. Mazda's extended base of domestic supplier networks became increasingly perturbed by the potential reversibility of the Japanese exchange fundamentals. As a demonstration of its long-term commitment to the development of Japanese market, in 1983 Ford proposed to make an intensive use of the Japanese parts in the world car version of its best-selling Escort brand. A joint Ford-Mazda feasibility study revealed that for satisfying the American Federal mileage requirements, at least 75% of the parts in the world car had to be US-designed. It took Ford five years to help Mazda engineer the inside of the vehicle. Still Ford had to design the sporty exterior on its own for sustaining the customer interest. In April 1990, the world car Escort 1991 was commercialized with an 80% US content. Escort met the product development cost target of $2 billion, against the Ford's normal development cost of $3 billion. Though it superceded the quality targets, the profitability remained much below the expectations due to sub-par engine and suspension performance. Ford had to redesign engine and suspension on its own for a true market success.

Ford gained growing cognizance of the weak creative fundamentals of the Mazda's home network. It accordingly financed a $500 million assembly and stamping plant in Mexico for making a sub-compact Tracer. Mazda was entrusted with the responsibility to acquire full

learning of the Tracer's project technology, covering all the core fundamentals such as product design, tooling and equipment, quality assurance, and employee training. Tracer was equipped with popular standard component features, and was backed by a $38 million annual advertising budget in the US. Tracer beat the low-price vehicles exported by the Japanese firms to the US in terms of its ability to capture the market premium. In 1987, Ford decided to buy half of the equity in Mazda's Michigan plant for $380 million in cash. Supported with an augmented learning opportunity, Mazda set an ambitious target to become Number 3 Japanese assembler after the leaders Toyota and Nissan. Until 1988, Mazda had been making only a limited product line. Thereafter, it invested $500 million on a high-tech automated assembly plant at Hofu in Japan, and allocated $1 billion annually for developing new products. These products encompassed a range of fancy sport models, including high-performance sedans and premium luxury cars. A bold plan for creating an independent luxury dealership in the US was enunciated. When the global exchange market took cognizance of the strengthening Japanese fundamentals, Mazda found its domestic sales to drastically drop beginning 1992. Given the escalating costs of domestic manufacturing, the US luxury dealership plan had to be abandoned. In 1993, Mazda lost a total of $360 million, and kept up its performance only in the Latin America. In 1994, Ford loaned some of its key personnel as expatriates to Mazda, and finally on April 12, 1996 put them at helm of the Mazda's affairs. Ford took its share of Mazda's equity from 25% to 33.4% using cash investment of $481 million, to support augmented technical support and advertising. Mazda Demio, redesigned under Ford's direct leadership, booked 11,200 units of orders within the first two weeks of its launch, far ahead of the monthly target of just 4,000 units.

The lead Japanese firms remained skeptical of Ford's contribution to the resurgence of Mazda. For one, it had taken nearly two decades since Ford's initial investments for Mazda to enjoy a super-normal market performance. Further, Isuzu Motors, in which the lead American assembler General Motors had owned 37.5% of the equity since 1971, lost $560 million on a

sales of $14 billion in 1991. Isuzu's passenger car facility, designed to break even at 150,000 units, was able to market only 129,000 units worldwide. The truck division was facing an escalating cost of research and development, amidst a tightening of the fuel emission standards internationally. General Motors placed one of its veteran employees as the Isuzu's Executive Vice President of corporate planning and manufacturing operations. Following the traditional Japanese model, Isuzu had been using a cab-over-engine configuration for making trucks. Isuzu had incrementally reengineered this engine in its design studio at Southern California, and generated advantages of better visibility, larger loading capacity, and improved maneuverability in the non-heavy duty truck segment. Under the new planning, Isuzu withdrew from the production of loss-making passenger cars, and focused on recreational vehicles, trucks and diesel engines where this core configuration could be applied. By 1993, Isuzu captured more than 50% share of the light to medium duty imported truck market of the US. Under the leadership of General Motors, Isuzu also gained a 4% share worth $3 billion of the booming Asian market. Still, it continued to lose money, amounting to $39 million in 1993, on its overall domestic operations. General Motors finally decided to develop a system for integrating its latest 5.7liter fuel and emission-saving gasoline engine, besides the automatic transmission, with the Isuzu's cab-over chassis. The new engine system was commercially applied to the trucks assembled at the General Motor's Wisconsin plant. The impact on the Isuzu's market reputation was not short of revolutionary. To illustrate, in 1996, Honda requested Isuzu to market 6000 of it new Honda Odyssey minivans as the front-drive Isuzu Oasis.

Nevertheless, the lead Japanese firms continued to put premium on the independent market services, rather than on the organizational services of the lead American assemblers. These priorities were guided by the firm-specific historical experiences. Nissan, to illustrate, had been an early mover in the British auto assembly landscape, with cash investments of $50 million in 1984. Nissan put together a team of British managers from the incumbent plants of Austin-

Rover and Ford-UK. Using a group of 520 workers, Nissan's British transplant quickly realized break-even performance on a production volume of 24,000 vehicles annually. During 1987-89, Nissan enjoyed 22% growth in the UK unit sales, far surpassing Toyota and Honda, and penetrated the European fleet-sales segment dominated by the quality-conscious business customers. Ford UK, which had enjoyed persistent profits for 20 years, lost $400 million in 1990 and $1400 million in 1991. Its share of the UK market fell from 29% in early 1987 to 23.6% in the early 1992. Its stock lost $6 billion in the market value, cornering it to slash 10,000 jobs. Nissan, in the meantime, acquired prominent position among the Japanese firms across the integrating European market. The fact is well illustrated from the case of French market, culled from Eurosystem (1997: 2), presented in Table 4.2.

Table 4.2: Unit Sales, By Firm, in French Car Market, 1996

All Firms	Units	Japanese Firms	Units
Peugeot Group	625,817	Nissan	34,184
Volkswagen Group	217,292	Toyota	17,562
Fiat Group	175,111	Honda	13,260
Ford Group	164,915	Suzuki	8,301
General Motors Group	157,885	Mazda	7,078
Others	139,012	Subaru	798
Japanese Group	85,201	Daihatsu	402
Total French Market	2,132,091	Total Japanese Sales	85,201

Right from the beginning, Nissan sought to invest its increasing returns for dominating the prestigious US market also. In 1984, it put up $660 million for initial investments in the Tennessee plant. Then it hired a 1943 retired Ford veteran as Chairman and Chief Executive Officer of its US operations in 1986, and offered another $190 million for discretionary investments. Still, Nissan suffered a 30% fall in its US sales volume over 1985 and 1991, even though enthusiasts and industry professionals ranked several of its vehicles among the best in their segments. In 1991, Nissan initiated a strategic alliance with Ford Motors. The objective was to learn the best manufacturing practices for the new Quest minivan designed by the Japanese product development unit, and to identify how the US technical cell could make more

productive contributions to the designing of a four-door Infiniti sports sedan and a stylish Altima. The sales of Altima surpassed all expectations. Nearly 50% of the Altima's buyers professed "that they have never been in a Nissan showroom before." (Business Week, 1993: 37) On the whole, Nissan enjoyed a considerable spurt in its exporting power, without commensurate costs of marketing or agency development over the early 1990s. This was despite the fact that its competitive advantage compared to the other Japanese firms sustained sharp entropy. The relevant data are summarized in Table 3. The raw data were obtained from NIKKEI NEEDS database, using the assistance of Takahiro Fujimoto at the University of Tokyo. The data pertain to the operations of Nissan Motors, excluding all subsidiaries, and were transformed from the accounting year basis to the calendar year basis. **Marketing development costs** are measured as the costs of marketing/sales. **Agency development costs** are measured as the costs of general and administrative expenses/sales. **Exports** are in million US$. **Competitive advantage** is measured as Nissan's sales/ (sales of 4 Japanese affiliated and of 4 US-affiliated auto assemblers in Japan). The 4 Japanese affiliated firms are Toyota, Nissan, Honda, and Daihatsu. The 4 US affiliated firms are Isuzu, Mazda, Mitsubishi, and Suzuki.

Table 4.3: Parameters for Organizational Profitability of Nissan Motors, 1985-93

	Marketing costs	Agency costs	Exports	Competitive Advantage
1985	11.12%	4.95%	8968	21.44%
1986	10.33%	4.38%	12826	20.14%
1987	9.91%	4.38%	12788	19.27%
1988	9.74%	4.44%	12597	18.42%
1989	9.51%	4.83%	11033	18.71%
1990	8.38%	4.81%	11261	18.33%
1991	7.90%	4.30%	12878	17.97%
1992	8.22%	4.12%	13886	16.93%
1993	8.69%	4.11%	15525	16.56%

The above analysis suggests considerable gains from the allocation of firm-specific resources to the purchase of technical services from the market. In contrast, the diffusion of these resources to the institutional stakeholders risks escalating commitments to the domestic

operations, as reflected in the rapid appreciation of the demand for yen-dominated services. Therefore it is proposed that:

Hypothesis: Organizational Profitability and Marketing Parity

The lower the resources freed to the (institutional) market for corporate control, the better the quality of technological servicing.

Operational Measures

A super-normal share of the institutions in the corporate value-added within any national geography increases the motivation for diffusing surplus resources to the international community. In 1990, institutional equity managed by Tokyo was valued more than that of the following 14 cities combined. But at the end of 1997, Tokyo, with $1.10 trillion of institutional equity assets, was relegated to the fourth position. London managed a record $1.8 trillion of assets. New York, with $1.55 trillion of assets, and Boston, with $1.13 trillion of assets, secured second and third positions respectively. Nearly $10 trillion of Japanese institutional resources were invested into low-interest savings and annuity accounts, primarily in the North America. The low risk credit diffused by the Japanese institutions strengthened the credit-creation power of the institutions worldwide, and significantly augmented the value of equity market capitalization. North American institutional equity investments reached an impressive $6.5 trillion, of which only 11.6% were committed to Asia. To put the diffusion role of Japanese institutions in perspective, world's total equity market capitalization stood at $20.9 trillion at the end of 1997 (Technimetrics Inc, 1998). Japanese institutions dominated the equity diffusion to the Asian market, and suffered considerable losses from the falling currency and stock market values.

The hollowing-out of Japanese institutional services caused the fall of yen on May 18th, 1998, to its lowest point at 136.11/$ since September 1991. Financial Times (1998: 31) reported, "Paul Chertkow, chief currency analyst at the Bank of Tokyo-Mitsubishi, points out that if interest rate differentials were all that mattered 'the dollar would be around Y200 now.'" Thus,

the limited diffusion of the resources to the Japanese institutions enabled yen to avoid another 50% fall in its value. The super-normal credit reputation of the principal global institutions accounted for the 50% of the yen's value. The high quality of technological services secured from the global agents sustained the residual 50% of the yen's value. Towards this end, Japanese government offered insurance on the overseas direct investments of the Japanese firms at costs about half that in Germany, and a fourth of that in the US. 33% of the Japanese exports relied on the home government's interest rate subsidies, as compared to just 5% of the German exports, and 2% of the American exports (Financial Times, 1997: 8). Therefore there is a need to correct the **insurance-effect** on the technological quality, while evaluating the proposed hypothesis.

Test of the Hypothesis

When the institutions appropriate a significant amount of corporate resources by way of interest and taxation, the firms suffer an escalating risk of technological obsolescence. The **overall cost of resources freed to the institutions** is therefore measured as the profit before interest, taxation, and depreciation. The firms might seek to compensate the institutional pressures by discovering new opportunities for generating increasing returns on the high quality services of the networked agents. The **agency development costs** are measured as the general and administrative costs. The data on the principal Japanese affiliates of the American auto assemblers were obtained from the NIKKEI NEEDS database, using the assistance of Takahiro Fujimoto at the University of Tokyo. These affiliates include Isuzu (affiliated to General Motors), Mazda (affiliated to Ford), and Mitsubishi Motors (affiliated to Chrysler). The data were transformed from the varying accounting year basis to a common calendar year basis, and were converted into the US$ for evaluating the quality of technological services at the international level. Table 4.4 presents the data on the institutional and agency costs, averaged over the three year segments during 1985-93, and over the full period. Institutional costs were greatest, and continuously increasing, for the Mitsubishi. Isuzu, and to some extent Mazda, were able to limit their institutional costs during

the 1990s. The compensating agency costs were also greatest for the Mitsubishi, and persistently rose for all the three firms.

Table 4.4: Average Annualized Costs of American Auto Affiliates in Japan, 1985-93

	Mitsubishi	Mazda	Isuzu	Average
Institutional Costs				
1985-87	192.0	166.6	1.9	120.1
1988-90	369.1	250.7	64.3	228.0
1991-93	428.7	16.0	-160.4	94.7
1985-93 overall	329.9	144.4	-31.4	147.6
Agency Costs				
1985-87	462.2	269.6	140.0	290.6
1988-90	816.1	437.4	228.3	493.9
1991-93	1080.3	587.0	281.8	649.7
1985-93 overall	786.2	431.4	216.7	478.1

Thus, the interactions with the reputed American assemblers generated escalating institutional demands on the affiliated firms, who were expected to generate increasing returns commensurate with the quality of American services. More reputed of the American assemblers offered better quality services for effective management of the institutional demands. The value of these services is measured in terms of the effectiveness of marketing reputation. **Reputation-effect** is measured as the '(firm's marketing costs/ firm's sales) – (firm's marketing costs over the period 1985-93/ firm's sales over the period 1985-93).' Annual data over the period 1985-93 are used for a sample of three firms: Mitsubishi, Mazda and Isuzu. To realize a sustainable advantage in disciplining the institutional demands for increasing returns on the more effective marketing, the affiliates could motivate their agents to more intensely exploit the super-normal services of the American principals. The value of the intensive exploitation is measured in terms of the focused emphasis on the American linkages. **Focus-effect** is measured as the '(firm's marketing costs/ firm's sales) – (Suzuki's marketing costs/ Suzuki's sales). Suzuki's data gives the norm for the base exploitation of the principal American services. Annual data over the period 1985-93 are used for a sample of three firms: Mitsubishi, Mazda, and Isuzu. In Table 4.5(a), institutional and agency costs are regressed on the reputation-effect and principal-effect.

The intercepts yield the **networking-effect**, or the gains from networking the American links as the principal agents. The t-values are in brackets.

Networking of the American leaders generated significant institutional costs, and motivated firms to make super-normal commitments to the agency development. Focus on exploiting the American services had a positive impact on the commitment to agency development. Enhanced reputation substantially cut the overall agency costs. American services had a moderate influence on the agency development initiatives, but had no influence on disciplining the institutional activism.

Table 4.5(a): Impact of American Services on the Japanese Auto Performance

	Institutional Costs	Agency Costs	test of difference
Networking-effect	247.89 (2.39)	808.01 (5.67)	-560.12 (-3.18)
Focus-effect	5096.89 (1.02)	17007.37 (2.48)	-11910.5 (-1.40)
Reputation-effect	-9503.70 (-1.58)	-17435.40 (-2.11)	7931.655 (0.78)
R sq.	0.095	0.224	

Japanese firms diffuse the gains from American services to develop the global market links. Such initiatives pre-empt the institutional diffusion of the rents to the potential competitors. The effectiveness of the normal path of the firm's agency commitments is termed as path-effect. **Path-effect** is measured as the '(firm's marketing costs aggregated over the period 1985-93/ firm's sales aggregated over the period 1985-93) – (industry's marketing costs/ industry's sales).' Annual data on the three Japanese firms, Mitsubishi, Mazda, and Isuzu, are used. Industry is operated in terms of the 4 American affiliates (Mitsubishi, Mazda, Isuzu, and Suzuki), and 4 Japanese affiliates (Toyota, Nissan, Honda, and Daihatsu). The super-normal development of path at any instant is termed as development-effect. **Development-effect** is measured as the '(firm's marketing costs/ firm's sales) – (industry's marketing costs/ industry's sales)'. In Table 4.5(b), institutional costs and agency costs are regressed on path-effect and development-effect. The resulting intercepts yield the **dependency-effect** of the American services. The t-values are in brackets.

Dependency on the US services generated significant institutional costs, but also helped firms make stronger commitments to the development of better quality agency. The innovative path of the firms furthered this better quality agency, without escalating institutional costs.

Table 4.5(b): Impact of Agency Organization on the Japanese Auto Performance

	Institutional Costs	Agency Costs	test of difference
Dependency-effect	179.40 (3.54)	602.92 (8.96)	-423.52 (-5.03)
Development-effect	-4658.47 (-0.88)	-106.48 (-0.02)	-4551.99 (-0.52)
Path-effect	9156.84 (1.52)	18657.85 (2.33)	-9501.01 (-0.95)
R sq.	0.088	0.269	

Japanese firms enhance their leadership position by absorbing the global fundamentals developed under the American service regime. The super-normal diffusion of the resources to the institutions, net of the innovative global links, is termed as institutional-effect. **Institutional-effect** is measured as the 'residuals of the institutional cost equation in Table 4.5(a) – corresponding residuals of the institutional cost equation in Table 4.5(b).' The super-normal costs of the agency initiatives, over and above that contributing to the global links, are termed as agency-effect. **Agency-effect** is measured as the 'residuals of the agency cost equation in Table 4.5(a) – corresponding residuals of the agency cost equation in Table 4.5(b).' There are a total of twenty-seven firm-by-year observations. The contribution of the institutional-effect and agency-effect on the leadership position of three prominent Japanese assemblers, viz. Toyota, Nissan, and Honda, is evaluated in Table 4.5(c). The leadership position is measured in terms of the $ value of annual exports of Toyota, Nissan, or Honda. The annual exports of these three firms are separately regressed on the corresponding annual values of the institutional-effect and agency-effect. The intercepts yield the **learning-effect** of absorbing the fundamental strengths of the global market. The t-values are in brackets.

Learning of the global fundamentals had the largest impact on the leadership position of Toyota, followed by that of Nissan, and then Honda. The agency costs of the American affiliates played the dominant catalyst role, with Toyota enjoying substantially stronger benefits. The

super-normal institutional demands on the American affiliates tended to limit the learning effectiveness, with Honda suffering the most persistent detrimental impact. Nissan and Honda had to rely considerably on the alternative global links for sustaining their lead performance.

Table 4.5(c): Impact of Innovative Learning on the Japanese Auto Exports

	Toyota Exports	Nissan Exports	Honda Exports
Learning-effect	19851.01 (29.86)	12126.75 (53.46)	11528.30 (30.97)
Agency-effect	130.35 (4.91)	32.49 (3.59)	54.35 (3.66)
Institutional-effect	-83.64 (-0.86)	-44.46 (-1.35)	-106.93 (-1.97)
R sq.	0.535	0.354	0.358

The contribution of the creative assembly of the global knowledge to the leadership of Toyota is termed as **Toyota-effect**, and is measured as the 'residuals of the Toyota Exports equation in Table 4.5(c).' Similarly, **Nissan-effect** is measured as the 'residuals of the Nissan Exports equation in Table 4.5(c),' and **Honda-effect** as the 'residuals of the Honda Exports equation in Table 4.5(c).' The following presents the regression of Toyota-effect on Nissan-effect and Honda-effect. There was a significant non-collinear unique factor in Nissan and Honda effects. Nissan-effect had a stronger impact on Toyota's leadership effectiveness, than the Honda-effect. Altogether, the three American affiliates and the two lead Japanese competitors contributed 95.2% to the Toyota's leadership.

Toyota-effect = 0.000 + 1.400 Nissan-effect + 0.935 Honda-effect R^2: 0.907 Cum. R^2: 0.952
(0.000) (4.51) (4.93)

The residual 4.8% variation in Toyota's exports comprised of an annual average Isuzu-effect of $40.80 million and Mitsubishi-effect of $8.80 million, with a balancing Mazda-effect of negative $49.60 million. These effects signal the super-normal learning of Toyota from its preferential joint venture alliance with the Isuzu's parent General Motors in the US. In the process of this learning, Toyota had to bear the super-normal costs of not exploiting the Nissan's focus on the Ford's vendors and employees, especially in Europe. Further, Toyota only partially absorbed the performance fundamentals of Mitsubishi's parent, Chrysler, even though Honda posted strong performance by focusing on the recreational vehicles pioneered by Chrysler.

Investigating the Correction Factor for Insurance-effect

The highly focused learning of the American potential by the lead Japanese firms generated high-powered incentives for the American firms to further the global technological frontier. Table 4.6 presents the breakthrough path, as manifested in the manufacturing of the US brand vehicles in the second quarter of the years 1996 and 1997. The US firms focused on developing the market for high quality trucks. These new products were manufactured using standardized technologies in the lower manpower cost landscapes. As such the corporations least reputed for the quality of firm-specific technological services enjoyed stronger growth in their leadership position.

Table 4.6: Manufacturing of the US brand vehicles in the II Quarter 96 and 97 (millions of units)

		1996	1997	Growth
	Total	3.52	3.54	0.47%
By Class	Cars	1.70	1.57	-8.07%
	Trucks	1.82	1.97	8.46%
By Nation	US	2.69	2.66	-0.88%
	Canada	0.61	0.63	2.46%
	Mexico	0.22	0.25	11.14%
By Firm	General Motors	1.55	1.55	0.06%
	Ford	1.22	1.20	-1.56%
	Chrysler	0.75	0.78	4.31%

Source: The Wall Street Journal (1997: A3).

Chrysler, for instance, retained the technical consulting services of Arthur D. Little to investigate the low-emission electric car technology. The prototype model developed by the Vancouver-based Ballard Power Systems used hydrogen as fuel. Hydrogen, owing to its dense volume, occupied large space, and required the prototype vehicles to be refueled every 100 miles. Arthur D. Little discovered an alternative of generating hydrogen on-line, using a refrigerator-sized fuel-cell. The fuel cell comprised of a special type of battery without any stored chemicals. The battery contained a proton exchange membrane, or electrolyte. The electrolyte was a thin plastic layer coated with a platinum catalyst. The platinum catalyst promoted chemical reaction between the stored gasoline and oxygen absorbed on-line from the atmosphere, to generate hydrogen. The fuel cell technology, as compared to the conventional internal combustion engine, offered double mileage per unit of gasoline. The polluting emissions such as nitrogen oxides

were just 10% of the conventional levels. Chrysler then approached the Delphi Auto Parts subsidiary of the General Motors. Delphi identified the feasibility of limiting the size of the fuel cell to a normal transmission tube 8 inches in diameter, using aluminum instead of the steel as the casing material. The tube could be fitted underneath the passenger compartment. The fuel cell engines adapted to the vehicle running temperatures were expected to cost $30,000 per unit, ten times the price of a conventional engine. The upside of finding an alternative fuel cell design was nevertheless substantial. Connecticut-based Energy Research Corporation showed that the fuel cell technology can help generate commercial electricity from a variety of renewable fuels such as biomass and landfill gas, as well as from non-renewable fuels such as coal, gas, alcohol, and diesel. But this fuel cell technology used temperatures approximating 700 degree centigrade.

Similar growth processes, using specialists networks, are diffusing internationally. Under the auspices of the German government, and supported jointly by the German auto-assemblers, a lead German university is investigating the potential of magnesium metal. The raw magnesium is highly inflammable and corrosion-prone. But the modern magnesium alloys "are high purity ones, [being] made in a closely controlled process. They have a corrosion resistance superior to most common aluminum alloys… Pound for pound, magnesium is more than twice the price of aluminum, its main competitor for weight-reduction projects… [Still] Parts which are complex, thin-walled and accurate can be die-cast from magnesium but not from aluminum… the instrument panel is an assembly for which magnesium is being increasingly used as a replacement for steel and plastic, materials which are cheaper than aluminum." Die-casting could be used, instead of the defect prone fasteners, to assemble several of the magnesium alloy components into a single system. These components saved 15% in weight over the conventional steel-based alternatives. The German program coordinator, Friedrich Klein, noted, "No diecasting machine designed specifically for magnesium alloys is currently available on the market… Diecasters have to adapt equipment originally intended for aluminum or zinc. We plan to design a machine,

which is optimized for magnesium alloys. In this way, the cost of casting could be cut by as much as 20 per cent." (Financial Times, May 6, 1997: 12)

The leading firms with commitments to older technology are under severe pressure. As a means to insure such pressures, Ford Motor Credit recently offered an attractive short-term two-year lease to the Ford customers. As the customers generously exercised the resale option, Ford Credit accumulated a growing volume of used vehicles. These vehicles, even when sold at just a fraction of the option value to the second-hand dealers, generated $20 million surplus for Ford Motor Credit in the fourth quarter of 1996. Still the overall pre-tax earnings dropped from $455 million in the fourth quarter of 1995 to $385 million in 1996. The credit losses on the sale of new vehicles had jumped $90 million, reaching 1.5% of the receivables up from 0.9% in the fourth quarter of 1995. Chrysler, with a greater reliance on the outside vendors, suffered a stronger credit loss on the new vehicles of $140 million in 1996, up from $86 million in 1995. Its overall credit earnings dropped more significantly from $97 million in the fourth quarter of 1995 to $83 million in 1996. Nevertheless, the consumer sentiments moved to record heights, thereby insuring super-normal profits on the new vehicle assembly. The (total scheduled debt payments/disposal personal income) ratio in the US reached a seven-year high of 7.2% in 1996, even with the personal bankruptcies touching an all-time high of 1 million annually.

Why Do the Firms Seek Emerging Technological Know-how?

The mobilization of the technological creativity of the market players, hitherto considered outside the industrial domain, helps firm expand the boundaries of their technical frontier without escalating costs. The fact is well illustrated by the Toyota's experiences with a recent fire that destroyed the main factory of its key supplier, Aisen Seiki. Kariya factory of Aisen Seiki, owned 22.6% by Toyota, was gutted by fire on February 1, 1997. The factory supplied 99% of Toyota's demand for 200 varieties of $5 break-fluid P-valves. P-valves apply break lines to proportion the hydraulic pressure between the front and rear wheels. Aisen Seiki estimated that it would take 6

months to get replacements for the highly specialized 506 units of machinery, that had been gutted by the fire. Toyota and its affiliates used 15,500 units/day of P-valves in Japan and another 6,500 units/day overseas. Following the just-in-time practices, they carried little inventory of P-valves. The Toyota group was consequently literally forced to shut down 20 of the 30 assembly lines in 18 domestic plants. The shut down caused a daily operating loss of 5.3 billion yen ($43.1 million), and a daily income loss of 0.l% to the Japanese economy. 18 test assembly lines quickly commissioned as back up at the Aisen Seiki's Handa factory, could supply just 10% of Toyota's requirements by February 19, 1997. Cognizant of the super-normal costs of the 6 months lead-time, Toyota decided to give blueprints for the valves to more than 20 affiliated suppliers on February 2 itself. After a hectic nation-wide search lasting two days, one of these affiliated suppliers, Taiho Kogyo Co., found that the domestic tool-makers are unwilling to service it at par with the larger more reputed affiliates. Taiho then sought the imported tools, which required very little reengineering for a flexible adaptation to the manufacturing of P-valves. Less than a day behind the larger affiliates, Taiho put together the first batch of 500 valves on February 6. Delegating much of the work to several subcontractors, and giving finishing touches at its own factory, Taiho was soon making five different kinds of P-valves at a volume of more than 2000 units/day. By February 7, the army of Toyota's affiliates as a whole was delivering 10,000 P-values/day to Toyota.

Toyota, nevertheless, was aware of the potential bottlenecks in some special varieties of P-valves, designed by Aisen Seiki for use in the popular higher-priced sports utilities. These P-valves carried complex tapered orifices, requiring an average of 30 different kinds of highly customized jigs, cutters, knives, and drills. Working in collaboration with its parent textile firm, Toyoda Automatic Loom Works, Toyota contacted Brother Industries Ltd., a maker of sewing and fax machines, on February 2, 1997. The engineers of Brother Industries Ltd. noted that a computerized milling machine, normally used for making sewing machine and typewriter parts,

could flexibly make the required P-values with only a simple re-programming. Brother Industries Ltd. took 10 minutes for making, and 5 minutes for inspecting each special P-valve. The network-wide learning effects were revolutionary. For instance, "Nisshin Kogyo Co., which was making the other 1% of Toyota's [specialized] P-valves, says that during the crisis it raised production efficiency by 30% by speeding up production." (The Wall Street Journal, 1996: A 16) On the whole, "Toyota promised the suppliers a bonus totaling about $100 million 'as a token of our appreciation,' says Mr. Okuda, its president. He adds that the auto maker will certainly remember the companies that pitched in during its crisis." During the fiscal 1997 ending March 31, Toyota generated the second largest gross profits in its history next only to fiscal 1990. For a complete diffusion of the new learning, Toyota commissioned a comprehensive audit of its production network. The audit began at its own plants, proceeded to the plants of the affiliated suppliers, and then to the smaller parts suppliers and contractors. As a result, no part was any longer manufactured pre-dominantly in one single factory.

Further in March 1997, Toyota declared its intention to commission a $1.6 billion car plant in France, offering to create more than 2,000 local jobs around the year 2000. Toyota's declaration came soon after Renault, the principal French auto-assembler, had announced 2,700 job cuts locally. Renault was also seeking to close down its Belgian plant, laying off all the 3,100 employees, in a move that brought forth 40,000 strong demonstrators at the European Community capital city Brussels. Unperturbed, Toyota directly informed its 200 European suppliers to be ready with individual offers to vend a targeted capacity of 200,000 vehicles/year at the French plant. These suppliers were already vending $800 million of parts/year to the engine and assembly plant of Toyota in the UK.

Conclusions and the Recommendations for Further Research

In the first quarter of 1998, "Toyota displaced Nissan from the role it has played for the past 20 years as the biggest-selling Japanese manufacturer in Western Europe. Toyota sold 115,442 cars

in the quarter… Nissan sold 108,942." Toyota immediately hired a senior Volkswagen executive, Juan Jose Diaz Ruiz, "as executive vice-president of Toyota Motor Europe Marketing and Engineering… to accelerate that process. He becomes the most senior non-Japanese in Toyota's European operations, directly responsible for all aspects of the business, including sales, marketing, and strategic planning." (Financial Times, 1998: II) The UK-educated Diaz Ruiz began his career as a trainee with Ford-UK. He was mandated by Ford to set up a new plant in Spain. Soon, Spain's Seat group hired him away to manage the exports of auto vehicles from Spain. In 1993, Volkswagen acquired the Seat group, and made him in-charge of Audi exports in Germany. Currently, only about a third of Toyota's worldwide model range is saleable in Europe. In future, the cars Toyota "produces within Europe – currently the Avensis and, within a few months, the Corolla at Burnaston in the UK, plus a small city car planned for a greenfield site in northern France – will be designed and developed in Europe and reflect the continent's tastes and preferences more than anything that has gone before."

The data on the number of passenger cars assembled in the ten largest Western European car producing nations, during the years 1995, 1996 and 1997, are available from World Automotive Manufacturing (1998: VIII). Data on the number of passenger cars newly registered during these years in the sample nations are also available. **Cost-effect**, reflecting the comparative cost-effectiveness of domestic production, is measured as the 'number of cars assembled in a nation during a year – number of cars assembled in the ten sample Western European nations during that year.' **Innovation-effect**, reflecting the changes in the cost-effectiveness of domestic production over time, is measured as the 'number of cars assembled in a nation during a year – number of cars assembled in the nation averaged over 1995, 1996 and 1997.' In Table 4.7, the new registration data are regressed on the corresponding nation-by-year data of cost-effect and innovation-effect. The intercepts yield **regional-effect**. The t-values are

in brackets. A comparative analysis for the ten largest emerging economies of the Eastern region is also presented. These economies include 8 South and East Asian nations, Poland and Romania.

Regional factors contributed to more than triple new car registrations in the Western European nations than those in the emerging Eastern nations. Cost-effectiveness of domestic production was not a significant factor in the local demand variations. 67.8% of the domestic innovation in cars of the Western European nations was customized to the local consumption. More than 50% of the innovation in the emerging Eastern nations was flexibly tradable to the international markets. 16.6% of the growth in the Western car usage derived from the supra-national innovations, compared to just 7.4% of that in the emerging Eastern car usage.

Table 4.7: Impact of Geographical Factors on the Customized Production of Cars Globally

	Western Demand	Eastern Demand	Test of difference
Regional-effect	1,168,733 (14.20)	344,400 (21.25)	824.333 (9.83)
Cost-effect	0.023 (0.02)	0.244 (0.79)	-0.22 (-0.19)
Innovation-effect	0.678 (11.64)	0.493 (18.33)	0.185 (2.88)
R sq.	0.834	0.926	

A strategic appreciation of the forces contributing to the innovation flexibility of the leading Western economies could help further the development of the Japanese firms. Such a dynamic inter-exchange of technological services would help develop the profitability of organizations perpetually.

References

Abegglen James C.; The Japanese Factory: aspects of its social organization, Free Press (1958).

Business Week; "Altima's secret," by Larry Armstrong, 3301, January 18, p. 37 (1993).

Clark Rodney; The Japanese Company, Yale University Press, New Haven (1979).

Cole Robert; Japanese Blue Collar, Berkeley: University of California Press (1971).

Dore Ronald P.; British factory, Japanese factory, Berkeley, Univ. of California Press (1973).

Drucker Peter; "What we can learn from Japanese Management", Harvard Business Review, 49(2), pp. 110-22 (1971).

Eurosystem; reported in Financial Times, "French Car Market," p. 2, March 18 (1997).

Financial Times; "No Added Burden," by Anna Kochan, p. 12, May 6 (1997).

Financial Times; "Eximbank and Opic face survival test in US," by Nancy Dunne, May 8 (1997).

Financial Times; "Diaz Ruiz steps on the gas," by John Griffiths, May 11, FT AUTO, p. 2 (1998).

Financial times; "Yen falls to seven-year low on dollar," by R. Adams, p. 31, May 19 (1998).

Franko Lawrence G.; The European multinationals, Conn. : Greylock (1976).

General Motors; United Control of Foreign Operations, corporate publication (1966).

Hofstede Geert; Culture's Consequences, CA: Sage Publications (1980).

Koike Kazuo; Understanding Industrial Relations in Modern Japan, London: MacMillan (1988).

Maslow Abraham H.; Motivation and Personality, II Edition, New York: Harper & Row (1970).

Schonberger Richard J.; Japanese manufacturing techniques, New York: Free Press (1982).

Stopford John M., and Louis T. Wells Jr.; Managing the multinational enterprise: organization of the firm and ownership of the subsidiaries, New York: Basic Books (1972).

Technimetrics; "London tops Tokyo as equity management center," reported in The Times of India, May 19 (1998).

The Wall Street Journal; "U.S. Auto Makers to Keep Output Level in New Quarter, Easing Inflation Fears," by Robert L. Simison, p. A 3, March 19 (1997).

The Wall Street Journal; "Toyota's Fast Rebound After Fire at Supplier Shows Why It is Tough," p. A 1, A 16, by Valerie Reitman, May 8 (1997).

World Automotive Manufacturing; in FT AUTO, Financial Times, p. 8, May 11 (1998).