Chapter 10

A Dynamic Model of Technological Exchange

What is the Essential Secret of Japanese International Reputation?

Abstract: Exchange is the fundamental building-bloc of all communities. The transactions that do not involve monetary compensation in at least one side of the exchange, are not usually competitive (or arms-length) in nature. These transactions, termed as barter or counter-trade exchange, derive from the failure of the market to offer appropriate monetary compensation for the traded products. The firms generate super-normal profits by offering a financial intermediation service. The clients need to have the requisite monetary power to compensate the firms. Else, they could seek an advance credit from the firms, using their products as collateral. Thus, the strategic credit creation power offers an excellent opportunity for super-normal profits. The implications for the growth in the international reputation of Japanese firms, along with a parallel diffusion of Japanese investment networks overseas, are dynamically evaluated.

Introduction

Over the recent years, Japanese firms have made considerable direct and portfolio investments overseas. These investments help derive super-normal rents from the international services, even as the value-added by domestic services has continuously declined over time. In his Nobel Prize Lecture, "Japan, the Ambiguous, and Myself," Oe (1994) elucidated that the Japanese development has been characterized by a strange ambiguous orientation:

> "This ambiguity which is so powerful and penetrating that it splits both the state and its people. The modernization of Japan has been oriented toward learning from and imitating the West. Yet Japan is situated in Asia and has firmly maintained its traditional culture. The ambiguous orientation of Japan drove the country into the position of an invader in Asia. On the other hand, the culture of modern Japan, which implied being thoroughly open to the West, long remained something obscure that was forever inscrutable to the West or that at least impeded understanding by the West. What was more, Japan was driven into isolation from other Asian countries, not only politically but also socially and culturally."

Shin'ichiro (1992: 1), President of the Japan Foundation, also noted that, "Japanese companies are making more active efforts to become better corporate citizens in the localities where they have built factories or subsidiaries and are trying harder to use their profits for the benefit of local society. These developments in the private sector are greatly to be welcomed, and the Japan Foundation would like to continue to work closely with the private sector in cultural exchange." Abo (1994) highlighted, "The process involves a kind of dilemma or tension: a lower 'application' leads to higher costs as superior aspects of Japanese methods are foregone, but at the same time a lower 'adaptation' also means higher costs as the benefits of acclimatization to the national conditions are lost." Japanese firms showed a distinctive "export-orientation and reluctance to invest overseas." Japanese plants in the US deployed substantial "Japanese material resources, such as equipment and functionally critical components," and "Japanese expatriates for managing advanced processes and quality control." The productivity of the Japan's transplants in the US, though lagging that of the plants within Japan by 25-30%, was higher than the productivity of the comparable US plants.

Under maturing domestic situations, firms from the developed nations often enhance their adaptive response through research and development of the emergent market opportunities. Grossman and Helpman (1991: 8,9,12) note, "The ratio of industrial research to gross fixed capital formation by business enterprises stood, in 1985, at 21 percent in the United States, 15 percent in the United Kingdom and Sweden, 14 percent in France, 13 percent in Japan, and 12 percent in Germany. These figures too have been rising through time," and comment "It might seem that industrial innovation has little relevance to the growth processes in the less developed economies [LDCs]. The LDCs perform virtually no commercial R&D and make few significant discoveries that are original to the world economy. Yet the process of industrialization in these countries does involve substantial technical change, in the sense that producers gain mastery over products and processes that are new to the local economy."

The above suggests two forces in the reputation of Japanese firms: (1) intensive diffusion of the technological know-how already discovered by the global markets, (2) extensive discovery of the technological know-how not yet diffused by the local markets. This work investigates the evidence on the first force, and suggests the second for further academic research.

Forces Guiding the Diffusion of Technological Know-how

Globalization offers significant opportunities for acquiring global knowledge endowments and diffusing them internationally. These opportunities are guided by the distinctive characteristics of the Eastern and Western persons, as summarized in Table 10.1:

Table 10.1: Comparative Behavioral Characteristics of the Eastern and Western Persons

Parameter	**Eastern Persons**	**Western Persons**
Causation of force	Doctrine of Immanence	Doctrine of Emanation
Movement of force	Ascending	Descending
Nature of force	Omnipermeating	Omnipotent
Target of force	Spiritual Sun	Material Sun
Motivator of force	Cosmic consciousness	Sentient Energy

Causation of Force: The globalization initiatives are immanent in the uniqueness of individuals and the diversity of organizational know-how. These forces emanate continuous opportunities for change and improvement. Table 10.2 gives the findings from a survey of the large corporations in Japan and the US conducted in 1980 by Kagono, Nonaka, Sakakibara, and Okumura (1985: 42-3). As is evident, top executives and business managers exchanged varying kinds of information. American firms sought the most logical definitive solution for guiding the future decisions. Japanese firms sought a tentative action plan under the overall supervision of the top executives.

Table 10.2: Strategic Tactics in the American and Japanese Corporations

Tactics	**Strategy**	**US**	**Japan**
Nemawashi (broad consultation before decision)	Executives and managers exchange information in advance of a formal meeting so that differences in opinion and judgment are not brought up at the meeting.	2.72	3.72*
Postponement	When there is a difference in opinion and judgment among executives and managers, they always seek to find a temporary compromise rather than to impose final decision.	2.94	3.06*

Imposition	The differences among executives and managers are promptly resolved based upon superiors' authority.	3.00	3.42*
Discussion	Executives and managers thoroughly discuss differences in opinion and judgment among themselves even though such discussions are time consuming.	3.50	3.32*

Note: * = $p < 0.05$ for the t-test of differences in means.

Movement of Force: The exchange of information among the individuals generates an ascending contribution to the integrative knowledge base. The flexible specialization descends further options for group-level training via exchange of individual learning. Table 10.3 reports a worldwide survey of the auto assembly plants conducted by MacDuffie and Kochan (1995). The analysis holds the effects of Asian and Australian plants as constant, and evaluates the amount of worker training with and without the control for flexible specialization. The US transplants in the Europe, as well as the European plants in Europe, used flexible specialization to reduce the hours of formal workforce training. Japanese transplant in the US, as well as the Japanese plants in Japan, used the flexible specialization to expand the level of workforce training.

Table 10.3: Number of Hours of Worker Training in Major Auto Plants

Parameter	without correction for flexible specialization	with correction for flexible specialization
North American plants in North America	0.00 (n/a)	0.00 (n/a)
US transplants in Europe	1.14 (11.7)	11.6 (12.4)
European plants in Europe	16.1 (8.55)	26.7 (9.70)
Japanese transplants in North America	18.99 (11.7)	-2.03 (14.8)
Japanese plants in Japan	36.7 (9.15)	1.53 (22.9)
Adj. R sq.	0.237	0.380

Note: standard errors in brackets.

Nature of Force: The omnipermeating group-level learning allows the firms to make focused commitments into the domains enjoying an omnipotent growth potential. Table 10.4 reports the hazard of a firm's exit from the US auto industry during the early formative years 1895 to 1912, analyzed by Rao (1994) using the archival data. The analysis holds the first as well as second order effects of the firm's age as constant, and evaluates the exit hazard with and without the correction for seed capital. A limited seed capital added to the exit hazard of the start-up firms only under fundamentally strong conditions: (1) a limited competitive intensity, (2) fast and reliable products

that assured repeated victories in the auto racing contests, and (3) a commercially viable gasoline technology.

Table 10.4: Hazard Rate for Exit from the US Automobile Industry, 1895-1912

Parameter	without correction for seed capital	with correction for seed capital
Start-up entrant	0.1870 (0.0890)*	-0.1600 (0.3157)
Number of incumbents	0.0046 (0.0001)*	0.0028 (0.0042)
Number of accumulated contests (log)	-0.0778 (0.0559)	-0.0353 (0.1609)
Number of accumulated victories (log)	-0.8824 (0.1426)*	-1.104 (0.4988)*
Gasoline technology	-0.2789 (0.0687)*	-0.3945 (0.1943)*
Seed Capital (log)	n/a	-0.0102 (0.0507)
N (chi sq.)	917 (138.54)	120 (38.45)

Note: standard errors are in brackets. * => $p < 0.05$.

Target of Force: An intense marketing orientation, bordering on the spiritual fanaticism, encourages the diffusion of successful group know-how for a material growth in the global standards of living. Table 10.5 gives the findings of a survey of the time taken to develop new products by the domestic auto firms in the US, Europe, and Japan, conducted by Clark and Fujimoto (1987). The American firms devote considerable time to the product planning, and the analysis of the engineering feasibility. The European firms plan their products based on the expected engineering feasibility, and keep open the option to substantially reengineer the system if new information is discovered subsequently. The Japanese firms focus most of their product development time to the process engineering, and plan their product engineering with a target of minimizing the fundamental system-wide changes.

Table 10.5: Comparative Product Development Performance of the Global Auto Firms

	US	Europe	Japan
Product Planning Phase	32 months	22 months	16 months
Product/ process Engineering Phase	28 months	25 months	24 months
System reengineering Phase	12 months	16 months	6 months
Total Product Development Time	62 months	62 months	43 months
(Planning-engineering overlap)	10 months	1 month	3 months

Motivator of Force: The excellence in exploitation of the infinite pools of sentient energy immanent in the cosmos, nurtures technological pre-eminence, and augments the productivity.

Teplensky, Pauly, Kimberly, Hillman, and Schwartz (1995) studied the adoption of magnetic resonance imaging equipment (MRI) technology by the US healthcare firms. They found the three alternative models -- profit maximization, clinical excellence, and technological pre-eminence -- to "account for roughly comparable amounts of variance in past adoption behavior. On the basis of explanatory power and parsimony, however, the technology model is best."

Hypothesis Formulation

In contrast to their traditional image for shoddy quality cheap products, Japanese firms are now reputed for the best-in-class quality and value for the customers of nearly all the income groups. Nevertheless, in many aspects they continue to lag behind the American firms. Japanese firms might sustain their technological growth through innovative linkages with the emerging as well as developed markets. These linkages further the overall strategic awareness of the distinguishing operating characteristics of the Eastern and Western persons, as summarized in Table 10.6.

Table 10.6: Comparative Operating Characteristics of the Eastern and Western Persons

Parameter	**Eastern Persons**	**Western Persons**
Valuation of Power	Epistemological	Axeological
Development of Power	Organic	Mechanistic
Discovery of Power	Introspection	Extroversion
Perfection of Power	Experiential	Referential
Diffusion of Power	Rhythms/ Organic resonance	Radiation/ vibrations

Valuation of Power: Epistemologically, market's valuation of the Japan's manpower has typically been substantially less than the valuation of the American, or even the German, manpower. There thus exist super-normal axeological opportunities for further organizational learning. Table 10.7(a) shows comparative data on the average $ wage compensation per worker for the auto and electronics sectors. The data are computed using the OECD database. During the early 1980s, auto wages rose most significantly in the US. Japanese auto firms sought to learn from the American workforce through direct manufacturing investments in the US. Japanese manpower thereby enjoyed super-normal growth in its market value during the late 1980s. German auto

manpower was also able to reengineer the prior maturity in its value. German manpower was actively engaged in the research into the exploitation of electronics technology, and the development of the higher-value luxury vehicles. The electronics manpower in Germany boosted its value to a level beyond that in the US.

Table 10.7(a): Comparative Market Value of Human Capital, 1976-90

	1976-90 Auto	1976-80 Auto	1981-85 Auto	1986-90 Auto	1986-90 Electronics
Japan	21046	12046	16306	32923	24728
Germany	26348	21025	21116	34954	30750
United States	33778	24890	36258	40765	29814

Development of Power: The organic growth of the global purchasing power has sustained the ability of the Japanese firms to expand their marketing operations. Table 10.7(b) shows comparative data on the average $ gross profit per worker for the auto and electronics sectors. The gross profit is measured as the gross operating surplus. Japanese auto manpower generated significantly higher gross profit than did the German or even American auto manpower. During the early 1980s, catalyzed by the automation technology, the US firms were able to more comprehensively service the surging incomes of the local manpower. As such the gross profits of the US auto manpower grew rapidly to take a lead over the Japanese. Japanese auto firms took cognizance of the American initiatives, and exported their older machinery bases overseas for reengineering. These exports helped to more than double the gross profits of the Japanese auto manpower during the late 1980s. The domestic plants in Japan sought to adopt a fully automated technology. The result was an unusual profitability of the Japanese electronics manpower. The German auto firms sought adaptation to the enhanced Japanese luxury competitiveness, by globalizing their vendor contacts. German auto manpower enjoyed a significant profit growth.

Table 10.7(b): Comparative Developmental Value of Human Capital, 1976-90

	1976-90 Auto	1976-80 Auto	1981-85 Auto	1986-90 Auto	1986-90 Electronics
Japan	22200.5	15860.2	16342.6	32929.2	22310
Germany	11404.1	9212.5	9377.0	14836.9	9883

United States	15152.6	9630.8	16530.8	19637.9	10126

Discovery of Power: The careful introspection can help Japanese firms appreciate the ability of the global vendors to generate profit-augmenting technological services. Table 10.7(c) gives the average $ value of parts and components used in the auto and electronics sectors. During the early 1980s, there was a significant growth in the value of material inputs used in the US auto industry. Supported with the technical services of the global vendors, Japanese firms developed new intellectual property rights on the popular recreational platforms. The diffusion of these rights to Japan helped more than double the sales to the auto assemblers during the late 1980s. German firms in the meantime realized considerable savings in the material cost. German electronics firms showed significant creativity in discovering the innovative material ingredients. Japanese electronic firms, using the information spillovers from their global alliances, actively exploited the world-class discoveries on the worldwide high quality sub-system vendors.

Table 10.7(c): Comparative Discovery of Material Endowments

	1976-90 Auto	1976-80 Auto	1981-85 Auto	1986-90 Auto	1986-90 Electronics
Japan	107039	62163	81817	167743	83672
Germany	77611	60826	57964	107479	55627
United States	123607	83718	125836	162897	50085

Perfection of Power: Japanese auto assemblers flexibly network of all the referent technological options worldwide. In Table 10.8(a), the data on the key elements of Japanese auto practices are evaluated. The data pertain to the averages of the transplants of Toyota, Nissan and Honda in each region. The Japanese Multinational Enterprise Study Group, coordinated by Tetsuo Abo, collected the raw data through its field visits over 1989-95. In the West, Japanese auto assemblers avoided labor unions, and shared authority equally with the local plants. In the US, they hired specialists to develop high quality product systems. In the UK, they motivated the workers to diffuse the process know-how through job rotation and internal promotion. The

skilled quality control personnel were hired to perfect the technology. In Taiwan, Japanese assemblers decentralized the authority to the local workforce union, under a moderate assistance from the expert staff. The plants realized top quality levels, thereby sustaining a normal diversity in jobs, and a normal growth in the internal promotion opportunities.

Table 10.8(a): Worldwide Perfection of Japanese Auto Assembly Technology

Variable	US	UK	Taiwan	Average
Labor Unions	5.00	4.67	4.33	4.67
Delegation of Authority	3.00	2.67	2.00	2.56
Job Rotation	3.33	4.33	3.67	3.78
Promotion System	3.00	4.00	3.67	3.56
Quality Control	4.00	3.67	4.00	3.89
Perfection Index	3.666	3.868	3.534	3.692

Diffusion of Power: The global operations of the Japanese assemblers vibrate with the rhythms of organic endowments networked from various local alliances. Table 10.8(b) shows data on the key target parameters of Japanese assembly technology. The American plants were responsible for productively maintaining the Japanese equipment using their own education and training. A flexible operations management was thus entrusted to the Taiwanese first-line supervisors.

Table 10.8(b): Worldwide Diffusion of Japanese Auto Assembly Technology

Variable	US	UK	Taiwan	Total
Operations Management	3.33	3.67	4.00	3.67
Japanese Equipment	4.00	3.67	3.33	3.67
Education & Training	3.33	3.67	3.67	3.56
First-Line Supervisors	3.00	3.33	3.67	3.33
Maintenance	3.00	3.67	3.67	3.44
Diffusion Index	3.332	3.602	3.668	3.534

To explain the evidence from the above analysis, it is further proposed that:

Hypothesis: Technological Exchange and Marketing Creativity

The more leader-oriented the organizational learning, the greater the international reputation.

Operational Measures

In a classic thesis on factor price equalization, Smith (1776: 202, 205, 207, 214) posited the "whole of the advantages and disadvantages of the different employment of labor and stock must,

in the same neighborhood, be either perfectly equal or continually tending to equality." The whole comprises of five factors, "first, the agreeableness or disagreeableness of the employment themselves; secondly, the easiness and cheapness, or the difficulty and expense of learning them; thirdly, the constancy or inconstancy of employment in them; fourthly, the small or great trust which must be reposed in those who exercise them; and fifthly, the probability or improbability of success in them" The less agreeable the employment, and the more the learning effort, the greater the share of stock sought by the labor. "What he earns… must not only maintain him while he is idle, but make him some compensation for those anxious and desponding moments which the thought of so precarious a situation must sometimes occasion… The different rates of profit, therefore, in different branches of trade, cannot arise from the different degrees of trust reposed in the traders… the common returns ought… to afford a surplus profit to the adventurers of the same nature with the profit of insurers."

A leader-oriented learning requires considerable effort, and is not always be agreeable. The labor trust is gained by focusing on the growing market niches, instead of the mature domains as might require insurance costs. The world's top auto assembler, General Motors (GM), for instance, lost its domestic share of the market from a high of 38.5% in October 1985 to 34.9% in October 1995 and further to 31.5% in October 1996. The Wall Street Journal (1996: A 4) reported that, ""much of the market share decline has been expected as the company phases out many of its tired car and minivan models and replaces them with new, higher-profit vehicles… GM officials say they won't be seeking to regain market share for its own sake. They said they will focus their efforts on building higher-profit retail-market share rather than going for high-volume but relatively low-profit sales to big rental fleets." "Lately, GM shares have been showing considerable buoyancy, reflecting renewed optimism by securities analysts."

Ford's programming of Gobal 2000 "visually spectacular technology" illustrates how a leader-orientation can help reengineer the maturing segments. The program uses on-screen

computer software to design new products that have super-normal ergonomic as well as commercial characteristics. The program, when diffused to all the outside vendors of Ford, will save $200 million of trial-and-error costs annually. The time to design and commission the production of new car models will be cut by a third from the current twenty-seven months. The program will also allow Ford to successfully implement the "World Escort" vehicle plan, which has matured over the last two decades with an investment of several hundred million dollars.

The learning initiatives of the internationally reputed players encourage others to also pursue a similar path of technological excellence. Japanese firms hired several locally trained scientists and engineers during the 1980s, and reduced their debt levels to the historical lows. Japanese pension fund managers invested their growing surplus of the risk-free capital into domestic stock and real estate, the average prices of which tripled in the four years since 1985. In late 1989, the newly elected governor of the Bank of Japan, Yasushi Mieno, noted the limited options for the highly government regulated pension fund industry, but derided the irrational exuberance that had unduly depreciated the yen fundamentals. “Within the next 10 months, he raised the discount rate to 6% from 3.75%. Financial markets initially discounted Mr. Mieno’s admonition, and the Nikkei hit its all-time high four days later. But the market soon got the message. The Nikkei fell almost 4% over the first seven trading days of January 1990. By October, it had lost almost half of its value.” (The Wall Street Journal, 1996: A2) Japan's domestic stock market wealth as of October 1990 equaled 75% of the annual gross domestic product, and was still on a downward trend. The decline in the unproductive investments contributed to a sharp rise in the yen fundamentals. The pension funds liquidated their overseas commitments to compensate the domestic credit squeeze. In the meantime, the US stock market wealth surged to more than 100% of the US gross domestic product. In contrast, during the fiscal year 1997-98, the total number of Japanese bankruptcies stood at a decade high of 17,439, with 15.1 trillion yen ($116.3 billion) of unpaid debts (Teikoku Databank Ltd., 1998). Japanese

pension funds began off-loading their accumulated unproductive loans to the US firms. The sales of loan portfolio were priced at about 60-80% discount from the book value. These experiences indicate a need to correct for the **history-effect** while testing the proposed hypothesis.

Test of the Hypothesis

The impact of leader-oriented organizational learning on the international reputation is evaluated using the early modernization experiences of Japan. At the time of the Meiji Restoration in 1868, Japan was quite rich in the raw material bases. Japanese firms developed significant exchange linkages with the four contemporary leading nations. These were the US and the UK in the West, and China and India in the East. The annual trade data of Japan with these nations for a 60-year period 1881-1940 are taken from Mitchell (1982). Table 10.9(a) summarizes the average value of the bilateral trade with each nation, during the six constituent decades, in million yen. Japanese firms initially focused on the UK over 1881-1890, the nation reputed for its global industrial leadership at the time. Chinese territory was invaded in 1894-95, and substantial extra-territorial donations were negotiated extending up to the decade of 1901-1910. Japanese firms devoted their prime energies over 1911-1930 to the learning of innovative American discoveries. The Great American Depression of the early 1930s shook the Japanese confidence. Japanese firms furthered their forays inside the Chinese territory over 1931-40, extending into the Indian borders.

Table 10.9(a): Annualized Trade of Pre-war Japan with Major Trading Partners in Million Yen

Period	UK	US	China	India	Total
1881-90	23.2	21.6	17.6	5.1	90.8
1891-1900	53.6	66.5	70.6	25.1	306.1
1901-10	104.7	172.3	165.9	79.0	783.7
1911-20	192.0	699.8	544.3	292.8	2557.6
1921-30	248.3	1362.1	856.4	453.5	4728.6
1931-40	172.1	1349.3	1271.8	461.4	6733.7

The depression in the US market offered significant potential to trade lower cost resources. To explore the evidence, Table 10.9(b) summarizes the average value of Japan's trade balance with each of the four top trading partners. During 1881-1900, Japanese firms sought to

import the British technology, and export the production to the mass American market. The learning from the British know-how encouraged them to exploit the emergent Chinese marketing option more intensively during the 1901-1910. The World War I stretched the British option, and encouraged the Japanese firms to look for the alternate Indian technological know-how. The unusual effectiveness of the Indian know-how catalyzed the Japanese marketing power in China during 1911-20. After the War, an innovative integration of the distinctive British and Indian know-how revolutionized the Japanese marketing in the US during 1921-30. The British limited Japan's access to the commonwealth territory over 1931-40. In a fit, Japanese firms acquired the alternative American know-how, and forced open China to post a record balance of trade.

Table 10.9(b): Annualized Trade Balance of Pre-war Japan with Major Trading Partners
(in Million Yen)

Period	UK	US	China	India	Total
1881-90	-13.3	13.8	0.9	-4.0	3.2
1891-1900	-38.4	21.9	9.6	-16.3	-25.9
1901-10	-64.5	44.7	50.7	-56.1	-39.1
1911-20	-22.8	28.0	128.3	-127.4	51.4
1921-30	-137.1	143.1	138.6	-176.1	-425.4
1931-40	41.3	-316.1	424.0	-19.2	64.5

The development of Japan's reputation over the Pre-war period is partitioned into two forces: (1) **Learning-effect**, reflected in the super-normal national revenues, measured as the 'government revenues – government expenditures.' The government revenues include the war donations received from China, and the government expenditures include the costs of infrastructure and military technology imported from various sources. The aggregate revenue-expenditure data are taken from Mitchell (1982), and are converted from the fiscal year basis to the calendar year equivalents using the simple time averages. (2) **Diffusion-effect**, reflected in Japan's purchasing power, measured as the aggregate of the notes of Government, National Bank, Yokohama Specie Bank, and Bank of Japan (excluding those held as reserves for other banks' issues). In Table 10.10(a), Japan's aggregate annual trade and trade balance data are regressed on

the learning and diffusion effects. The analysis is conducted for the two periods: 1881-1910, and 1911-40. The intercepts yield the constant **reputation-effect**. The t-values are in brackets.

The impact of Japan's reputation on trade changed from a negative one during 1881-1910 to a positive one during 1911-40. Over 1881-1910, Japanese learning reduced the trade value. During 1911-40, the trade-generating power of the Japanese capital fell nearly 50%. The impact of Japan's reputation on trade balance was persistently positive during 1881-1910, but not so over 1911-40. The learning-effect on trade balance became intensely negative by 1911-40. The diffusion of capital was reoriented from the purchases of overseas endowments during 1881-1910, to the export promotion during 1911-40.

Table 10.10(a): Overall Impact of the Leader-oriented Learning in Pre-war Japan

	Trade 1881-1910	Trade 1911-1940	BOT 1881-1910	BOT 1911-1940
Reputation-effect	-525.029 (-10.104)	1146.787 (2.593)	63.429 (2.302)	-149.762 (-1.072)
Learning-effect	-0.593 (-2.784)	-0.200 (-0.428)	0.200 (1.767)	-0.423 (-2.859)
Diffusion-effect	4.366 (15.715)	2.356 (9.367)	-0.442 (-3.000)	0.233 (2.930)
R sq.	0.954	0.796	0.279	0.300

An added US-oriented organizational learning helped Japanese firms limit the escalating costs of the UK-oriented organizational learning. In Table 10.10(b), Japan's trade balance with the UK is regressed on the learning-effect and diffusion-effect. A similar analysis is done for the Japan's trade balance with the US. Reputation significantly neutralized the negative trade balance with the UK over 1881-1910. By 1911-40, the learning-effect exerted a significantly negative impact, and the reputation no longer was effective. Japanese firms tried to diffuse capital for promoting the exports to the UK instead of the purchases. They also sought to use their reputation to expand trade balance with the US. The learning-effect, that had yielded significant trade surpluses with the US over 1891-1910, weakened over 1911-40. The diffusion of capital was now oriented towards the purchases from the US. On the whole, Japanese firms reduced

their reliance on the UK-oriented learning and the purchases from the UK. They deployed the domestic capital resources for purchasing from the US, and marketing to the UK.

Table 10.10(b): Factors in the Diminished Reliance on the Leader-oriented Learning

	UK 1881-1910	UK 1911-1940	US 1881-1910	US 1911-1940
Reputation-effect	36.001 (4.178)	-33.404 (-0.976)	6.651 (0.601)	180.323 (2.258)
Learning-effect	0.060 (1.712)	-0.110 (-3.034)	0.113 (2.488)	0.126 (1.497)
Diffusion-effect	-0.359 (-7.787)	0.049 (2.508)	0.059 (1.000)	-0.207 (-4.564)
R sq.	0.825	0.287	0.560	0.440

The complementary exploitation of the lower cost Chinese services helped Japanese firms sustain a competitive processing of the UK-oriented organizational learning. In Table 10.10(c), Japan's trade balance with China is regressed on the learning-effect and diffusion-effect. Reputation significantly neutralized Japan's positive trade balance with China. The learning-effect generated strong incentives to purchase the Chinese services. Japanese firms thus found the diffusion of capital for exploiting the consumption power of China quite an attractive option.

To validate the causative factors in the above option, a similar analysis is conducted for Japan's trade balance with India. Reputation neutralized the negative trade balance of Japan with India over 1881-1910, but considerably added to the negative trade balance over 1911-40. Learning had a similar effect over the two periods. In contrast, the diffusion had an opposite effect over the two periods. These findings suggest that during 1881-1910, the UK-oriented organizational learning, and the resulting reputation-effect, yielded a considerable competitive advantage to the Japanese firms in India. Japanese firms diffused capital for purchasing Indian services, which not only had a low cost but also a quality distinctive from that of the Chinese services. Over 1911-40, the integrative global-oriented organizational learning, and the resulting reputation, encouraged significant purchase of distinctive and low cost Indian services. Still, the diffusion of capital offered only a modest, though stable, marketing advantage in India.

Table 10.10(c): Factors in the Globalization of Japan's Reputation

	China 1881-1910	China 1911-1940	India 1881-1910	India 1911-1940

Reputation-effect	-57.236 (-6.522)	-105.573 (-2.055)	48.500 (5.509)	-103.900 (-3.682)
Learning-effect	-0.128 (-3.563)	-0.136 (-2.509)	0.088 (2.428)	-0.148 (-4.949)
Diffusion-effect	0.392 (8.350)	0.281 (9.606)	-0.363 (-7.718)	0.069 (4.275)
R sq.	0.792	0.781	0.797	0.525

Correction Factor for the History-effect

The super-normal effectiveness of capital diffusion in generating marketing advantage in China derived from the geographical proximity. This proximity offered Japanese firms a better insight into the Chinese behavior. After defeating China in the 1894-95 war, Japanese negotiated generous donations of gold from China. Japan was in the process of rapidly exhausting its natural resource endowments. The extra-territorial rights on China offered distinctive advantage in purchasing additional raw materials at decreasing costs. At the time, the US firms were gaining reputation for developing innovative value-adding services, and exporting them internationally. By the end of World War I, the US actually emerged as the largest capital creditor in the world. The US was the natural focus for learning the leadership value of the innovative efforts. Thus Japanese firms had strong incentives for reorienting their primary learning focus to the US.

The impact of the **corrected** leader-oriented learning on Japan's **trading effectiveness** is measured as the residuals of the trade equation in Table 10.10(a)**.** The impact on Japan's competitive advantage effectiveness (BOT) is measured as the residuals of the trade balance equation in Table 10.10(a)**.** The gains from an innovative adaptation to the US are termed as the **Adaptation-effect.** Adaptation-effect is measured using the residuals of Table 10.10(b), as the "residuals of the US trade balance equation – residuals of the UK trade balance equation." The gains from an extended creative exploitation of the Chinese option are termed as the **Application-effect**. Application-effect is measured using the residuals of Table 10.10(c) as the "residuals of the Chinese trade balance equation – residuals of the Indian trade balance equation."

In Table 10.11, trading effectiveness is regressed on adaptation-effect and application-effect, separately for each period. A similar analysis is conducted for the competitive

effectiveness (BOT). The intercepts yield the contribution of Japan' initial learning, or **history-effect.** The overall contribution of the Western-oriented organizational learning is given by Cum. R sq. [i.e. including the R sq. of Table 10.10(a)]. The t-values are in brackets.

Historical learning had no independent impact on the trading or competitive effectiveness. Adaptation of the American know-how caused the trade to diminish, and the effects on competitiveness tended to be negative. The application of the integrated worldwide learning significantly enhanced the trading-effectiveness in China over 1881-1910. Over 1911-1940, the sustained application caused the value of imports to decline, and the overall trading-effectiveness remained essentially the same. The contribution of the Eastern exchange option in Japan's competitive effectiveness thereby fell from 65% in 1881-1910 to 50% in 1911-40.

Table 10.11: Correction Factor for the History-effect in Japan's International Reputation

	Trade 1881-1910	Trade 1911-1940	BOT 1881-1910	BOT 1911-1940
History-effect	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Application-effect	2.587 (5.815)	0.596 (0.448)	-0.084 (-0.248)	1.084 (2.821)
Adaptation-effect	0.924 (0.965)	-1.571 (-2.000)	1.209 (1.666)	-0.321 (-1.416)
R sq.	0.558	0.138	0.098	0.281
Cum R sq.	0.980	0.824	0.350	0.500

The weak co-specialization of the Chinese endowments with the Western-oriented technologies accounted for the diminishing effectiveness of importing the Chinese resources. In these conditions, an innovative exploitation of the more specialized Indian technological endowments led the super-normal growth in the trading balance of Japan over time. Table 10.12 gives the correlation between trade and trade-balance of Japan using (1) the raw data (zero order correlation), (2) the residuals of Table 10.10(a) [i.e. after correcting for the leader-oriented learning), and (3) the residuals of Table 10.11 [i.e. after further correcting for the history-effect]. Japan's trade was pre-dominantly import-oriented during 1891-1910. The leader-oriented organizational learning was the dominating force in the import intensity. The history-effect fostered significant growth in exports over 1911-1940. The leader-oriented organizational

learning limited the exports to the level of imports. Thus, on the whole, Japanese firms neutralized the historical liability, and realized competitive parity over 1911-40.

Table 10.12: Correlation between Trade and Balance of Trade in Pre-war Japan

	Zero-order Correlation	Correction for the Leader-oriented organizational learning	Further Correction for the History-effect
1881-1910	-0.5048	-0.2327	-0.3454
1911-1940	0.1627	-0.3168	-0.5702

What is the Essential Secret of Japanese International Reputation?

The early exports of Post-Meiji Japan comprised pre-dominantly of the raw silk and silk waste, besides tea and precious metals. Over the subsequent years, Japanese firms began exporting silk in the processed fabric form. By the turn of the century, Japanese firms were actively exporting coarse-grained cotton yarn primarily to China. The strong reputation of the British cotton manufacturing industry attracted several Japanese firms. The early Japanese entrants into the textile industry relied squarely on the women and child labor. The super-normal export demand during the World War I allowed them to hire significant amounts of costlier male farm labor also.

Sample and Data Source: Japan's innovative development of the raw silk (or **innovation-effect**) is measured as the exports of raw silk. Japan's creative development of the silk fabrics (or **creativity-effect**) is measured as the exports of silk fabrics. The alternative benefits from contesting advantage from a less reputed market in the cotton manufacturing are evaluated using the case of India. These **potential benefits** are measured as 'India's exports of processed cotton/ India's exports of raw cotton.' All raw data are in millions of yen per year, and were taken from Mitchell (1982). The analysis is done for the two separate periods: 1886-1915, and 1916-45.

Table 10.13(a) evaluates the impact of silk development on the potential benefits from developing the cotton processing industry. The benefits are regressed on the innovation-effect and creativity-effect. The intercepts yield the average productivity (or **productivity-effect**) of the cotton processing opportunity, net of Japan's silk development. The t-values are in brackets.

The productivity of learning the cotton processing know-how significantly rose between 1886-1915 and 1916-1945. Japanese innovations in the raw silk techniques negatively impacted the productivity of India-oriented learning. Japan's creative development of the silk processing technology tended to encourage India-oriented learning. These findings suggest that Japanese firms were seeking to upgrade their advantage from the raw silk to the processed silk products. Such initiatives had an increasingly positive impact on the productivity of India-oriented learning.

Table 10.13(a): Dynamic Benefits of the India-oriented Learning

	1886-1915	1916-45	Test of Change
Productivity-effect	0.7950 (12.914)	3.5220 (4.354)	2.7270 (3.362)
Innovation-effect	-0.0045 (-2.914)	-0.0091 (-3.835)	-0.0046 (-1.629)
Creativity-effect	0.0088 (1.661)	0.0177 (1.351)	0.0089 (0.631)
R sq.	0.327	0.433	

The actual productivity of the India-oriented learning was substantially greater, since Indian cotton processing know-how helped flexibly process the silk also. The productivity of the Indian know-how to process the alternative materials is evaluated as 'India's exports of processed jute/ India's exports of raw jute.' In Table 10.13(b), jute productivity is regressed on the innovation-effect and creativity-effect. Between 1886-1915 and 1916-1945, there emerged significant productivity benefits of learning the alternative jute processing know-how. Japan's innovative focus on the raw silk development had an increasingly negative impact on the productivity of such learning. Japan's creative silk processing know-how had a diminishing and insignificant impact. These findings suggest that the effectiveness of overseas learning encouraged the Japanese firms to rapidly diversify from silk processing, to the cotton processing.

Table 10.13(b): Dynamic Exchange Value of the India-oriented Learning

	1886-1915	1916-45	Test of Change
Productivity-effect	0.2118 (1.959)	4.7743 (8.533)	4.5625 (8.006)
Innovation-effect	0.0046 (1.708)	-0.0048 (-2.899)	-0.0094 (-2.964)
Creativity-effect	0.0093 (1.005)	0.0022 (0.237)	-0.0072 (-0.553)
R sq.	0.569	0.395	

For a sustained growth, Japanese firms integrated the flexible India-oriented learning with their accumulated reputation on the Western landscape. This yielded super-normal value through marketing of the processed silk products. The overall competitive gains from the exchange of Indian know-how are evaluated as (1) India's trade balance with the UK/ India's bilateral trade with the UK, and (2) India's trade balance with the US/ India's bilateral trade with the US. The potential benefits of a directly competing marketing strategy (commodity-effect) are measured as the residual of cotton processing productivity equation in Table 10.13(a). The potential benefits of a unique marketing strategy (differentiation-effect) are measured as the residual of the jute processing productivity equation in Table 10.13(b).

Table 10.14(a) reports the results for the regression of the overall competitive benefits with the two nations on the commodity-effect and differentiation-effect. The analysis is for 1886-1915. The intercepts yield the **cost-effectiveness** of the Indian resource endowments. The t-values are in brackets. Indian endowments were significantly less cost-effective than the British endowments, but more cost-effective than the American endowments. The application of the Indian know-how to the commodity products yielded a significant competitive advantage in the US, but not in the UK. A differentiated application of the Indian know-how yielded a significant competitive advantage in the UK, but in the US. India's weak advantage with the UK in the commodity products was a function of the traded know-how. In contrast, India's strong advantage with the US in these products was a function of the non-traded know-how. On the whole these findings suggest that the Indian firms sustained their competitiveness through the development of differentiated products, not yet appropriated by the British principals.

Table 10.14(a): Japan's Dynamic Competitive Advantage during 1886-1915

	With the UK	With the US	Test of Difference
Cost-effectiveness	-0.2943 (-23.390)	0.5467 (21.592)	-0.8410 (-29.745)
Commodity-effect	0.0178 (0.245)	0.3301 (2.255)	-0.3123 (-1.911)
Differentiation-effect	0.1364 (3.293)	-0.0751 (-0.901)	0.2115 (2.272)
R sq.	0.287	0.187	

Table 10.14(b) reports the results for 1916-45 period, when the Japanese firms had accumulated greater organizational learning about India. The Indian resources no longer held a cost disadvantage with the UK. Further, the cost advantage with the US diminished from the 1816-1915 period. The application of the Indian know-how to the commodity products offered greater than historical advantage with the UK, but the advantage with the US totally disappeared. The differentiated application of the Indian know-how no longer yielded any advantage with the UK. The traded know-how contributed the same 12.1% to the India's cost advantage with the UK as well as the US. On the whole, these findings highlight that Japanese firms derived significant advantage through further discoveries of the Indian know-how.

Table 10.14(b): Japan's Dynamic Competitive Advantage during 1916-1945

	With the UK	With the US	Test of Difference
Cost-effectiveness	-0.0753 (-1.735)	0.1686 (5.093)	-0.2439 (-4.468)
Commodity-effect	0.0415 (1.735)	0.0251 (1.376)	0.0164 (0.545)
Differentiation-effect	0.0168 (0.486)	-0.0420 (-1.590)	0.0588 (1.352)
R sq.	0.121	0.121	

Conclusions and the Recommendations for Further Research

In recent years, multinationals from the developed nations have forged significant contractual alliances with the Chinese firms. In 1996, China had a $40 billion trade surplus with the US. 75% of the Chinese exports comprised of the subcontracting arrangements with the foreign firms. The share of Chinese exports accounted by the foreign equity supported arrangements grew rapidly from 1% in 1984 to 27% in 1994 and further to 44% in 1996. Several internationally reputed firms such as Sony were leaders in harnessing the Chinese know-how, for cost-effective manufacturing of a variety of products including consumer electronics. Typically, Chinese factories received the generally traded patented components from their foreign partners, and offered services valued at 20% of the cost of imported inputs. The resulting products were then sold in the premium US market, under reputed brand names such as the Adidas, with a "Made in China" label (The Wall Street Journal, 1997: A 1).

Bharat and Khanna (1996) provide data on the new collaborative alliances of the American manufacturing firms over 1990-93. In Table 10.15, industry distribution for the three major types of alliances is computed using those data. In the pharmaceuticals and the chemicals sectors, American firms were able to revolutionize their growth through the licensing of know-how from the upstart biotechnology firms. In the computers and electronics sectors, American firms were growing rapidly through a pre-dominant focus on the zero-equity sub-contracting arrangements. These arrangements included research and development, equipment manufacturing, and marketing operations. In the other, maturing, sectors, firms had been primarily focused on the joint venture equity alliances.

Table 10.15: Industry Distribution of the US Alliances over 1990-93

Alliance Type	Pharmaceuticals and chemicals	Computers and Office Equipment	Electronics Equipment	Others
Licensing	45.29%	11.79%	22.15%	20.78%
Joint Venture	24.36%	12.52%	16.93%	46.18%
Countertrade	27.05%	22.57%	29.13%	21.25%

The diffusion of capital into the less risky emerging market options helps the firms enhance returns on their diffused capital, but also limits the focus on reengineering of maturing domestic investments. On December 9, the first major meeting of the World Trade Organization (WTO) was held at Singapore. The German economics minister Guenther Rexrodt suggested that "We must not bring into the WTO a confrontation about cultural and social values," which "could encourage rich countries to punish [the emerging markets] for lower standards [of human capital valuation]." The acting US Trade representative Charlene Barshefsky noted that "the organization must deal with the fear of workers around the globe that free trade threatens their jobs." He explained to the worldwide trade envoys, "you can run but you can't hide," and highlighted the significance of "new rules that link improved labor rights to trade expansion."

WTO Act (1994) provides rules for expanding trade with a view to foster universal growth in the standards of living, and thereby to enhance the worldwide labor rights. These rules

bar the governments to refrain from directly or indirectly servicing the firms, (i) if such services are in law or in fact contingent on export performance, or (ii) if it acts directly or indirectly to promote exports and income of a given nation while injuring production/ exports in other nations (Part 1 of Article XVI, p. 508, The Legal Texts, 1994). Annex I of Agreement on Subsidies and Countervailing Measures illustrates the prohibited subsidies as follows: "(k) The grant by governments (or special institutions controlled by and/or acting under the authority of governments) of export credits at rates below those which they actually have to pay for the funds so employed (or would have to pay if they borrowed on international capital markets in order to obtain funds of the same maturity and other credit terms and denominated in the same currency as the export credit), or the payment by them of all or part of the costs incurred by exporters or financial institutions in obtaining credits, in so far as they are used to secure a material advantage in the field of export credit terms; (l) Any other charge on the public account constituting an export subsidy in the sense of Article XVI..." (p. 305).

The application of localized endowments creates a positive demonstration-effect in the global markets. Eventual stabilization helps commercialize the previously culturally embodied know-how, and obviates the history dependent maturation-effect. A strategic intentionality, along with the devotional intensity and emotional intensity, can help any group realize reputation par excellence. Therefore there is a need for a dedicated development of the cross-cultural (i) Awareness, (ii) Operating Awareness (iii) Working Awareness (iv) Understanding (v) Operating Understanding (vi) Working Understanding (vii) Intelligence (viii) Operating Intelligence (ix) Working Intelligence (x) Wisdom (xi) Prudence (xii) Excellence (xiii) Enlightenment (xiv) Intuition (xv) Illumination (xvi) Perfection. The organization of the transnational know-how would help firms realize parities in the productivity levels. They could then devote sufficient energies for making additional discoveries that are truly original to the modern global economy.

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