

A Dynamic Model of Japanese Investment System

A Comparative Investigation of Japanese Hybrid Factories in Asia, Europe and America

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This paper conducts a dynamic modeling of Japanese investment system in Asia, Europe and America. It quantifies the proficiency of Japanese investment system as a function of home nation factor, industry factor, corporate factor, and local region factor. The findings show that Asian transplants are characterized by "Super Investment System", European transplants are characterized by "Supra Investment System", and American transplants are characterized by "Supreme Investment System". The causative factors in these characteristics, that appear incompatible with the previous research and general perception, are systematically presented in the paper.

The paper investigates the significance of distinctive cultural heuristics for investment management, and the relevance of designing a culturally-appropriate technology. It quantifies the impact of ideal-typical "rational expectations," and of "bounded rationality" driven evolutionary theory (Nelson and Winter, 1982) on the investment proficiency. It also quantifies the interaction-effects of "demarcation-consciousness" in the recipient cultural systems (Abo, 1994) and "flexible specialization" manufacturing approach of the Japanese work-culture system (Piore and Sabel, 1984). Finally a systematic test of the Akamatsu's (1950) famous "flying-geese" model is provided, and the recommendations for a dynamic reengineering the Japanese investment system are suggested.

1. Introduction

The past decade has seen a rapid diffusion of Japanese investment networks overseas. Such diffusion has been accompanied by significant modifications in the fundamental principles of Japanese investment system. Research by Japanese Multinational Enterprise Study Group (JMESG) shows that Japanese production and management technology has been rooted in specific Japanese cultural and work culture systems. As a result, Japanese firms tend to follow a trial-and-error approach to "application" of their indigenous technologies and "adaptation" to the overseas local conditions. This paper conducts a dynamic modeling of the proportionate impact of three kinds of factors on the proficiency of Japanese investment system: (1) the

ideal case of rational expectations of full application of high-performance Japanese technologies in the overseas transplant, (2) the evolutionary theory case based on bounded rationality, predicting the transplant-specific trajectory, and (3) the revised application case for hybridizing and designing an appropriate technology to network the linkages of home culture, local culture, industrial technology and transplant activities. The need for the study arises from the fact that the gap between the full rational expectations and bounded rationality needs to be strategically bridged by networking, to minimize the "performance paradox" of weak linkages limiting the dynamism of strong linkages (Meyer and Gupta, 1994). Bowman, Gupta and Saponic (1994), based on a major Wharton School project on "Global Competition 2000," have emphasized that multi-faceted networking is key to the leadership in the emerging global environment of cut-throat competition. A proficient transfer of this technology overseas requires systematic efforts on the part of Japanese Multinational Corporations. These efforts are generally hampered by differences in cultural systems, and so problems in gaining strategic awareness of the local dynamics in foreign nations (Kumon, 1993).

A wide stream of literature is available on Japanese investment system overseas, and on the local conditionalities in the three regions. Some of the prominent research is included at the end as recommended readings. The precedents of the current paper lay in the research of JMESG, that has investigated the overall pattern of hybridization of technologies in the three regions: Asia, Europe and America. Kumon (1994) has shown that Asian transplants have an application pattern similar to their European counterparts, and this pattern is substantially different from that of the American transplants. Abo (1994) shows that the lack of demarcation consciousness in Asian nations has facilitated the transfer of production and management technology to Asia, but in general the Japanese firms have been "reluctant" overseas investors. Piore and Sabel (1984) on the other hand have argued that the peculiar characteristics of modern technologies and demand have provided the push for "flexible specialization" in the developed nations, wherein the developing nations provide the subcontracting (and demand) services and act as residual absorbers of downside risks of business cycles in the developed nations. This is considered to support the vertical division of labor, based on dynamic comparative advantage, through the continuous transfer of lower-order or low-tech activities to the developing nations and upgradation of the investment system in the developed nations. Japan is known to be the ideal-typical case of such a "sequential" life-cycle, referred to as the "flying geese" model following Akamatsu (1950).

The findings of the research show that reluctance to invest has led to an increase in the quality gap between Japan and overseas transplants. As a result there tends to be a large gap between the authority and tasks assigned to the local subsidiaries and their actual competencies in carrying-out these responsibilities. This adversely affects the commitment and sense of belongingness of the local subsidiaries to the corporation. Japanese management tries to compensate for the inadequate competencies through increased usurping of the authority of local managers, and as such further alienates the local workforce.

The situation is worst in Asia because of an overtly high expectation of the Japanese MNCs from their Asian transplants, under the presumption that Asian culture is more similar to the Japanese culture than are the other cultures. As a result

local culture effect on competencies (human skill formation and egalitarian wage systems) as well as commitment (promotion system, supervisory system, participation) is quite adverse in Asia. Therefore the proficiency of production system activities such as quality control and maintenance is impeded. This in turn threatens “hollowing-out” of the management power from Japan, and downgrades the local investment system to a “super investment system”.

The situation in Europe is better, because the expectations from the European workforce are much lower. Therefore the gap between authority and responsibility tends to be only 13% against 30% in case of Asia. There exist substantial positive local effects on enhancement of competencies through multi-skilling and flexible job rotation in case of Europe. However, under ideal -ordeal rational expectations of workforce’s responsibility for sense of belongingness to the company, Japanese MNEs fail to give adequate attention to information sharing and participation system in Europe. As the local conditions of Europe place a great premium on the information sharing and participation for cultivating such sense, the commitment is adversely affected. Therefore local investment system is able to realize only a “supra investment system” level.

The situation in America is very interesting. Because of various institutional factors, local effects on proficiency of transfer of most of the elements is quite negative. Still Japanese MNCs (Multinational Corporations) are able to realize a supreme proficiency in their American investment systems because they save costs of workforce training and job rotation, of participation- promoting investments, and make money on export of equipment amidst the difficulties of realizing kaizen-type local improvement, that is otherwise assured automatically by the evolutionary theoretic behavior.

Thus the overall incremental value of investments has been greatest in the region where the conditions for transfer of Japanese-style are most unfavorable, and has been the least in the region where the conditions are most favorable. The study concludes with a need for an overall strategic survey of Japanese overseas investments and tactical approach to perpetuate additional investments. This is essential to prevent the hollowing-out of Japan and its multinationals.

2. Criteria for Evaluation

In the ascending-order levels of proficiency, Investment Systems can be evaluated as: “Super Investment System”, “Supra Investment System”, and “Supreme Investment System”. In the age of globalization all domestic firms are able to realize the super level. The average multinational firm is able to realize a supra level. The leading multinationals aim for the supreme investment system to remain at the top of cut-throat global competition.

3. Research Model

The total potential of Japanese investment system overseas may be partitioned into four causative factors (a) local factors (b) corporate factors (c) industry factors (d) global factors. The local factors represent cultural conditions of the host nations, and

affect the nature of adaptation. The corporate factors represent the global hybridization approaches of the specific Japanese MNCs. The industry factors represent technological properties of the industries. Finally the global factors represent the elements internalized by all the Japanese MNCs as a function of their common home country. It includes interaction between the Japanese system and the local system, to the extent the effects of such interaction are common to all the Japanese MNCs and thus a part of their hybridization heuristics. At an international level, MNCs continuously strive to realize simultaneous globalization (application) and localization (adaptation), in a way that develops the full potential of the network without any need for trade-offs.

The application-adaptation model is designed to evaluate the degree of transfer of Japanese production and management technology to the overseas nations. The data have been collected by the members of JMESG through their personal visits to Japanese overseas transplants over a 7 year period 1989-95. The complete data has 23 technology elements evaluated over a Hybrid Evaluation Scale of 1 ('adaptation' = low proficiency) to 5 ("application" = high proficiency) units of hybrid ratios.

This research uses 16 of these items that pertain directly to the investment system. The background of the dynamic modeling is available in Gupta and Abo (1995). The model begins with a sample of 9 leading Japanese MNCs-three each in automobile, consumer electronics, and intermediate goods industries. The data for 3 plants for each MNC is taken-one from each region: Asia, Europe and America. Then corporate, industry and region averages for each hybrid item are taken.

In order to ensure that all values are in common denominator, all averages are converted into Hondas, i.e. Honda hybrid ratio per unit of hybrid ratio of a given company, industry or region. The choice of Honda as a denominator is based on the findings of Gupta and Abo (1995), that Honda's networking system is the most proficient of all the automobile companies in the sample (i.e. Honda, Nissan and Toyota). Therefore Honda's proportionate significance on different aspects of investment system is the best estimator of the most proficient approach. The study of Mair (1994) confirms that Honda is among the best coordinators of both global as well as local factors in the world.

Then the raw industry effect is computed by taking pair-wise difference between the industry average and the region average. The raw corporate effect is computed as pair-wise difference between the corporate average and the region average. The regressions are conducted on each of the 16 hybrid ratios over 27 transplants with raw industry effect and raw corporate effect as explanatory variables. As the estimated regression coefficients of these two variables are in terms of Hybrid-Hondas per unit of transplant hybrid ratio, a correction factor is applied by dividing estimated industry effect and estimated corporate effect with Hondas per unit of transplant hybrid ratio. This ensures that the estimated values are in common denominator. The constant gives the overlapping linkage of industries - i.e. Japan culture effect. The corrected residual gives the remaining effect in the equation - i.e. region effect or local culture effect.

The potential hybrid ratio is computed by taking absolute values of all the components. Then the proportionate significance of each effect is computed. The common denominator for the three regional alternatives region is computed by summing up global corporate effect and local effect, into an integrative "networking" effect.

4. Conditionalities of Japanese Investment System

Japanese investment system is based on three kinds of linkages:

Ascending Linkages of Dynamic Networking

Japanese investment system emphasizes a systematic voluntary involvement and networking of employees as the key source for productivity. Standardized work information is available to all employees at the work site - machine capacity, manpower requirements, standardized work sequence, target time and standardized inventories - in order to eliminate all confusion. These standards are established by the team leaders, based on previous improvements in standards and current demand patterns. When the target time is shorter, employees are encouraged to revise these standards through team-based kaizens to realize improvement in productivity (including improved working conditions). Kaizen process generally also follows a systematic sequence: the employees first try to modify methods (work), then equipment, and then - if the target is still not realized - the team itself by adding new members. Work kaizen includes modifying work procedures, reorganizing and redistributing work, and rearranging layouts. Equipment kaizen includes installing new equipment to automate work.

When target time is greater than the old cycle time, usually more-experienced employees with broader skills are transferred to other teams or assigned special projects for process improvements. The system facilitates a dynamic potentiation of the workforce potential, because no limitations are imposed on the nature and scope of improvements suggested and implemented by any individual employee. The modifications in the work content for transforming older products into new products or varieties, emerge as an outcome of networking the creative contributions of various employees in the system. When the time pressure is low, a broader work range is provided to each worker to facilitate training. Each worker begins training in one process, and then gets training at least in the preceding and the succeeding process as part of the formal policy. Gradually work range is enhanced. The continuous broadening of skills enhances the employee ability to take up routine maintenance spontaneously. The repairs and maintenance specialists as well as team leaders are developed from the entry-level employees. Even the top managers work their way through the shop floor, make frequent visits to the shop floor and offer active suggestions on specialized improvements in various areas. Additional support for allowing broader ranged work is provided through operations management - such as flexible setup and special jigs and fixtures for simple automation. The goal is to impart mastery to each worker of every job at his or her worksite, so that any member of the team can help or even fill in for any other member of the team.

To sum-up, Japanese investment system utilizes two kinds of dynamic linkages in workforce investment. The backward linkages to the teams are used to capitalize on all previous sources of productivity, and the forward linkages from the teams for realizing further enhancement in productivity. The focus is to eliminate two kinds of waste (i) motion that doesn't contribute to real work (ii) waiting imposed by ineffi-

cient work sequences. Thus the companies make a full utilization of all opportunities - whether boom or bust - to realize a continuously increasing productivity. And as no boundaries are imposed on the utilization of local opportunities, the local networking is very proficient and ensures a quantum upgradation in the investment system to the "supreme" level. The extent to which the local transplants are proficient in networking all the opportunities for facilitating the absorption of Japanese parent company know-how, can be operationalized in terms of "networking-effect," the average sum total of the corporate-effect and the variable local-effect.

Descending Linkages of Theoretical Impediments

Japanese manufacturing system is designed to minimize all descending linkages. Each machine must perform appropriate degree of processing without spending any more time or effort. This includes avoiding all defects at source, and dynamic elimination of theoretical work arising from machine design that does not contribute to real work: e.g. distance traveled by a drill.

A smooth production flow is the most important consideration in arranging the work sequence. The sequential flow of machine is standardized at various levels. At the broadest level, product moves from body welding to painting, through assembly, and to final shipment. Each succeeding machine is kept as close to preceding machine as possible to minimize the conveyance time.

The underlying heuristic of machine power is Jidoka - a dynamic stabilization of machine so that machine does useful work for the workforce rather than demanding service from it. Jidoka is aimed at reducing defects and raising yields, as well as streamlining operations. Two kinds of jidoka are utilized: (i) mechanical jidoka, such as sensors for detecting a defective item, or a missing bolt in a work-piece, or for enabling the new employees to avoid previously "known" inefficient procedures. (ii) human jidoka, such as overhead ropes that can be pulled by all employees whenever they detect any "new" abnormality. These means provide a strategic awareness of the overall state of the plant, as well as tactical approach to solve all problems immediately.

The cost-effectiveness of investing in automated mechanical jidoka, and the intra-firm diffusion of human jidoka know-how, tends to vary with the industrial technology (Abo, 1994); and can be quantified in terms of "industry-effect." The Japanese system constantly questions the theoretical assumptions underlying the industrial technology, such as Honda's 1978 interpretation of the American logic of long-and-low cars in terms of "theory of automobile evolution," for developing its "Tall Boy" urban-city-car model based on a modified heuristic of short-and tall on (Nonaka, 1991). Such creativity facilitates a quantum jump in the investment proficiency to a "supra" level.

Parallel Linkages of Ideal Standards

Japanese approach to investment was developed by Kiichiro Toyoda using the heuristic of just-in-time, and was perfected by Taichi Ohno, based on the logistical operations of American supermarkets. Ohno's heuristic was "Pull System", translated into the goal of smooth, direct work flow, by realizing a high flexibility in manpower and machine power and seeking (i) zero lead time for consumer delivery, (ii) zero set-

up times, zero defects and zero machine idle time, (iii) zero employee idle time (iv) zero inventories - both static as well as dynamic (i.e. on a conveyor), and (v) zero response time. Japanese investment model places an emphasis on eliminating all waste inflicted by the less perfect previous methods, and to avoid all side-effects of new methods by seeking such methods as serve their purpose without demanding any service of their own. For example, each vehicle carries a vehicle specification sheet - so that people working on any part can reconfirm easily what procedures and parts to use. Each material lot carries its own kanban - giving material specifications, so that appropriate material is used and new orders are automatically placed as the parts are consumed. Each machine carries its own machine specifications, work procedures and time duration. As material and machine have increasingly realized their own true service potential, workforce has been able to concentrate on its real competencies. The investigation of Gupta (1995b) into the Japanese cultural system has revealed that the ideals such as above are a function of a distinctive corporate-oriented behavior of the Japanese groups, and their impact may be quantified as "Japan-effect." Japan-effect ensures a quantum edge in proficiency, that manifests as a "super investment system".

It is clear that the degree of transferability of this ideal state of Japanese investment model is a function of the commitment (devotional intensity to work) and competency (emotional intensity to learn) of the local workforce.

5. Dynamic Modeling of the Alternatives

The following analysis first investigates the Japanese investment system in Asia. Then the system in Europe and America is compared in relation to Asia.

Japanese Investment System in Asia

On an overall basis, local factors in Asia have a more significant impact on Japanese hybridization pattern than have either industry or corporate factors. In proportionate terms, local factors most significantly affect the management system-particularly delegation of authority and assignment of responsibilities to the local managers. Delegation of authority is the only aspect of Asian investment system where local factors dominate global factors - 65.9% of the potential in authority delegation is accounted for by the local factors, as against only 31.4% by the global Japan factors. However there is a much less local variation in responsibilities to the local managers: 35.8% of the overall potential, against 46.2% potential accounted for by global effects. This imbalance in authority-responsibility is a product of global as well as local conditionalities - on the one hand it shows absence of Japanese-style voluntary involvement and devotion of workforce to the company in overseas nations, and on the other hand it shows impatience of the Japanese MNCs and their inability till date to nurture creative and innovative linkages for revised application of their delegated authority. As a result there tends to be a significant intervention of Japanese headquarters in the transplant operations, that often encroaches upon the pre-delegated authority of the transplant (See Table 1 (a)).

An investigation into the organization system shows that local factors account for

Table 1 (a) Japanese Investment System Potential in Asia

Asia Hybrid Sub-Systems	Current Hybrid Ratio	Japan Effect	Uncorrected Industry Effect	Uncorrected Corporate Effect	Industry Effect	Corporate Effect	Local Effect	Potential Hybrid Ratio	Japan Potential	Industry Potential	Corporate Potential	Local Potential
Production	3.33	3.34			-0.01	0.07	-0.07	3.48	95.9%	0.2%	1.9%	1.9%
Maintenance	3.00	2.94	0.05	-0.07	0.01	0.01	0.04	3.00	97.9%	0.3%	0.4%	1.3%
Quality Control	3.22	3.29	-0.01	0.06	-0.01	0.07	-0.13	3.51	93.9%	0.3%	2.1%	3.8%
Operations Management	3.33	3.40	-0.03	0.09	-0.03	0.11	-0.15	3.68	92.2%	0.7%	3.1%	4.1%
Equipment	3.78	3.74	0.00	0.00	0.00	0.07	-0.03	3.84	97.2%	0.1%	1.9%	0.7%
Participation	3.44	3.31			0.06	-0.01	0.08	3.47	95.4%	1.9%	0.4%	2.3%
Small Group	3.11	2.79	0.28	-0.26	0.24	-0.17	0.24	3.45	81.0%	7.1%	4.9%	7.1%
Information Sharing	3.78	3.63	0.03	-0.15	0.02	-0.05	0.18	3.88	93.4%	0.6%	1.3%	4.7%
Sense of Unity	3.44	3.52	-0.06	0.09	-0.07	0.18	-0.18	3.96	89.0%	1.8%	4.5%	4.7%
Organization	3.37	3.17			0.14	-0.07	0.13	3.52	90.0%	4.1%	2.1%	3.8%
Job Classification	4.67	3.96	0.82	-0.76	0.58	-0.50	0.63	5.66	70.0%	10.2%	8.8%	11.1%
Education & Training	2.89	2.79	0.09	-0.13	0.02	-0.01	0.08	2.91	96.0%	0.8%	0.3%	2.8%
Job Rotation	2.56	2.75	-0.11	0.16	-0.17	0.28	-0.31	3.51	78.4%	4.9%	8.0%	8.7%
Administration	3.15	3.09			0.09	-0.08	0.05	3.31	93.4%	2.6%	2.4%	1.6%
Wage System	3.22	2.92	0.34	-0.31	0.21	-0.16	0.25	3.54	82.4%	6.0%	4.5%	7.1%
Promotion System	3.33	3.27	0.05	-0.02	0.03	0.02	0.01	3.33	98.1%	1.0%	0.6%	0.3%
Supervisory System	2.89	3.08	0.01	-0.14	0.01	-0.11	-0.10	3.30	93.5%	0.3%	3.2%	3.0%
Management	3.11	1.82			0.83	-0.59	1.05	4.30	42.4%	19.3%	13.8%	24.5%
Authority Delegation	2.89	0.95	0.01	-0.01	0.01	-0.07	1.99	3.03	31.4%	0.5%	2.3%	65.9%
Local Responsibility	1.89	1.10	0.19	-0.21	0.18	-0.24	0.85	2.37	46.2%	7.8%	10.1%	35.8%
Non-expatriates	4.56	3.42	1.69	-1.13	2.29	-1.47	0.32	7.49	45.6%	30.6%	19.6%	4.2%
OVERALL	3.28	2.97			0.21	-0.13	0.23	3.54	84.0%	5.9%	3.6%	6.5%

11.1% of the total potential application of job classification in Asia, while education & training policy accounts for only 2.8%. In contrast, global Japan factors account for comparatively low 70% of the total potential for revised application of job classification, in contrast to their 96% impact on education & training. There is a large 8.8% negative corporate-effect on the job classification, signaling a strong "mismatch" or gap between the rational expectations of the Japanese multinationals for the classification of workforce activities, and the actually historically evolved conditions in the local system. Such mismatches arise as the specific sequence of training progression — as indicated by the job classification that captures the boundaries for internal promotion ladders — in Japanese Asian transplants are not compatible with the local heuristics. The fact that local effects on job rotation are negative, accounting for 8.7% of its potential, rule out the possibilities of informal responsibilities being given to the employees. If appropriate hybridization approach for developing potential of the local employees and local subsidiary, through design of appropriate scope of job and responsibilities, is missing, then the MNC assessment of the performance of local subsidiaries and workforce might be incorrectly downgraded over time.

One can analyze the administration system, i.e. internal labor market dynamics, to determine whether such gaps have positive, neutral or negative effects on the local workculture environment in Asia. Theoretically, it is possible that the assignment of greater authority enhances upward mobility of the workforce, even if the local norms and heuristics for carrying out the assigned tasks are different, through revised learning of the local workforce. On the other hand, if workforce is promoted based on assigned position, rather than on its potential and competencies, then the proficiency of Japanese investment system will be severely hampered. This would occur because the workforce will have to devote time to bridge the gap between Japanese know-how imparted by training, and the locally-desired heuristics for the assigned job. In fact the effectiveness of informal networking might weaken over time, as the supporting building-bloc backward linkages for searching, absorbing and networking the desired know-how are continuously bounded. The real data show that the local effects of 7.1% on application of performance-based wage systems are not improved by the internal labor markets. Therefore local factors account for only 0.3% in promotion system, while the ability of supervisors in performing a strategic function as in Japan is actually hampered by negative local effects of 3%.

Is there any evidence that such negative local effects dynamically downgrade the strategic alliances among the workforce, subsidiary and the parent company by increasing dissatisfaction (Elger and Smith, 1994)? One can investigate this by looking at the participation system. Interestingly local effects have a positive 7.1% effect on voluntary participation and contribution of workers in form of small group activities. However this effect is significantly neutralized by a 4.9% negative effect of corporate-specific factors - indicating that in the majority of transplants, positive local culture effect of voluntary participation in corporate activities is being lost by the expectation-evolution gap in terms of both static (i.e. range of functions) as well as dynamic (i.e. significance of functions or promotion) responsibilities. The impact of this on the local morale can be seen in the effectiveness of information sharing. Even though the corporate effect becomes proportionately more significant - from -0.17 to -0.05, the local effect deteriorates from 0.24 to 0.18, or from 7.1% of potential to 4.7% of potential. Finally, the negative local effects fully neutralize 4.5% positive corporate

effects on devices and arrangements for enhancement of sense of unity: open-style offices, socialization etc.

What are the consequences of the above dynamics on material core of the investment system - i.e. work-site production system? As can be expected from the conditionalities of Japanese investment system whose strength derive from the human factor and its devotional intensity to the corporation, the ideal-type approach of Japanese MNCs in Asia adversely affects overall proficiency of the local investment system. Most of the potential of production system is rooted in factors common to all Japanese MNCs, with 92-97% of the potential of all individual items being a function of Japan effect. The negative local effects on quality control of 3.8% of total potential reveal weakened forward linkages in the in-process quality assurance by the workers. This indicates a weaker detection of errors at source, which results in a significant waste of material and time. The negative 4.1% local effects on operations management reveal weaknesses in capitalization of the work-manual and maintenance know-how obtained from Japan, in local kaizen activities, and in adopting a flexible investment approach of low set-up costs, small lot sizes and varied product mix. Also low 1.3% positive local effects on maintenance, along with an average of 3.0 hybrid ratio corresponding to the state where "Experienced workers hired separately but receive additional internal training before being promoted to maintenance personnel; shopfloor workers do not have any commitment to maintenance". These weak local effects are in contrast to the positive corporate effects on maintenance, quality control and operations management, indicating the significance firms attach to market needs and customer satisfaction.

As a whole, these findings explain the mass production nature of Japanese transplants in Asia. It is also quite clear that difficulties being experienced by the Japanese MNCs in enhancing the sourcing of low-cost higher-quality sophisticated intermediate products from overseas transplants in Asia, are essentially rooted in the ideal standards of Japanese MNCs, and the consequential adverse effects on the morale of local workforce. As a result of the transfer of inappropriate work-content in Asia, investments in Asia are now increasingly being perceived as competitive to investments in Japan.

The authenticating evidence for this is shown by the industry effects on Asian investment system. Industry effects, which primarily incorporate product technology related factors, have a substantial 29.1% negative effect on the substitution of Japanese expatriates with the local employees. While in general Japanese firms tend to switch from direct management investments to indirect management investments under conditions of strong local system (Gupta and Abo, 1995), the industry factors impede bridging of the gap between real potential of technological base at the plant-level and the technological network desired by the Japanese MNCs. Industry effects are similarly negative on assigning local responsibilities, even where authority has been delegated to the local subsidiary. The implicit ideal expectations have a negative effect on the application of skill-based wage and promotion systems, indicating that in their desperation to improve local quality the Japanese firms adopt an approach that compensates the local subsidiaries and workforce without receiving any corresponding forward linkages to the corporate network. In fact such an approach further alienates the workers by destroying their sense of confidence, as is reflected in 4.7% negative effects on sense of unity and 8.9% negative effects on pre-

ventive maintenance. As a result, Japanese MNCs in most industries suffer equipment wastage and have to make greater investments of their indigenous equipment in the local transplants. In other words the value of equipment instead of improving through kaizen as in Japan, in fact tends to deteriorate over time.

The costly and wasteful outcomes in the Asian investment system are remarkably in opposition to the outcomes in the indigenous investment system, where the training approach is a function of indigenous cultural norms of Japan. Gupta (1995a) has observed that such waste in the overseas transplants reduces the overall profitability of the Japanese parents, increases the costs of intermediate parts supplied by the transplants, reduces the competitiveness of final products manufactured within Japan, and thereby threatens the "hollowing-out" of overall Japanese investments. Yet in comparison to the Japanese parents the local Asian transplants retain a higher proficiency, and so in terms of proficiency may be characterized as "super investment systems."

Japanese Investment System in Europe

European investment system, just like its Asian counterpart, is characterized by a predominance of local effects in the management system - in particular delegation of authority where 72.4% of total potential is accounted for by the local factors in contrast to just 39.2% effect of the global factors. Further, local effect on assignment of responsibilities to local managers accounts for 58.6% of the total potential - indicating again an authority-responsibility misalignment. As the gestation period of Japanese transplants in Europe has been smaller than that of the transplants in Asia, the Japanese MNCs have relied upon direct investment of management power, or the Japanese expatriates (see Gupta and Abo, 1995). Therefore it will be interesting to investigate whether or not a direct investment approach in Europe allows the Japanese MNCs to avoid the hollowing-out consequences under an indirect investment (i.e. centralization of authority in the parent company) approach as found above in their Asian networks (Table 1 (b)).

A distinctive feature of the European investment system is the presence of significant job demarcations - theoretically which are rooted in crafts tradition of Europe. As a result local effects on flexible job classification are marginally negative at 1% of total potential. Thus there is a lower institutional flexibility in Europe as compared to Asia for assigning broader authority and responsibilities to the workforce. The findings show that in fact presence of such institutional inflexibilities encourage Japanese MNCs to adopt a more proactive approach in their European transplants: the local effects on formal education and training in Europe are very substantial at 16.9%, compared to negative 9.2% corporate-wide network effects. More interesting is the even greater significance of local factors in job rotation and multi-skilling: 23.6% of the total potential is due to local effects, as compared to a negative 10.5% corporate effect. As a result Japan effect is much lower at only 57.5%, against 78.4% found in the Asian case. Finally as a whole, local factors at 13.9% effect on organization system substantially outweigh both corporate as well as industrial effects of negative 6.8% and positive 5.4%.

How does such an enthusiastic revised application by the Japanese MNCs at the local level affect their administration system? In contrast to the Asian case, both

Table 1 (b) Japanese Investment System Potential in Europe

Asia Hybrid Sub-Systems	Current Hybrid Ratio	Japan Effect	Uncorrected Industry Effect	Uncorrected Corporate Effect	Industry Effect	Corporate Effect	Local Effect	Potential Hybrid Ratio	Japan Potential	Industry Potential	Corporate Potential	Local Potential
Production	3.39	3.34			0.06	0.02	-0.04	3.46	96.6%	1.7%	0.7%	1.0%
Maintenance	3.47	2.94	0.43	-0.35	0.34	-0.20	0.39	3.88	75.8%	8.9%	5.2%	10.2%
Quality Control	3.39	3.29	0.01	0.04	0.00	0.06	0.03	3.39	97.1%	0.1%	1.8%	1.0%
Operations Management	3.47	3.40	0.00	-0.06	0.00	-0.03	0.10	3.53	96.3%	0.0%	0.8%	2.9%
Equipment	3.22	3.74	-0.10	0.22	-0.11	0.26	-0.67	4.78	78.2%	2.2%	5.5%	14.0%
Participation	3.32	3.31			-0.03	-0.02	0.06	3.42	96.7%	0.8%	0.7%	1.8%
Small Group	2.72	2.79	-0.28	0.15	-0.27	0.18	0.02	3.27	85.5%	8.3%	5.7%	0.6%
Information Sharing	3.33	3.63	-0.02	0.06	-0.03	0.10	-0.37	4.12	88.0%	0.6%	2.4%	8.9%
Sense of Unity	3.92	3.52	0.27	-0.44	0.22	-0.35	0.53	4.62	76.1%	4.7%	7.7%	11.6%
Organization	3.70	3.17			0.23	-0.29	0.60	4.28	73.9%	5.4%	6.8%	13.9%
Job Classification	3.78	2.75	0.67	-0.91	0.40	-0.50	1.13	4.78	57.5%	8.4%	10.5%	23.6%
Education & Training	3.39	2.79	0.40	-0.57	0.28	-0.38	0.70	4.16	67.2%	6.7%	9.2%	16.9%
Job Rotation	2.56	2.75	-0.11	0.16	-0.17	0.28	-0.31	3.51	78.4%	4.9%	8.0%	8.7%
Administration	3.36	3.09			0.27	-0.29	0.29	3.93	78.6%	6.8%	7.3%	7.4%
Wage System	3.50	2.92	0.65	-0.59	0.52	-0.48	0.54	4.46	65.4%	11.8%	10.8%	12.1%
Promotion System	3.58	3.27	0.30	-0.44	0.26	-0.39	0.44	4.37	74.8%	6.0%	9.0%	10.2%
Supervisory System	3.00	3.08	0.01	-0.05	0.01	0.02	-0.11	3.22	95.7%	0.3%	0.6%	3.4%
Management	3.10	1.82			-0.77	0.49	1.56	4.65	39.2%	16.6%	10.6%	33.6%
Authority Delegation	3.69	0.95	-0.03	-0.05	-0.04	-0.12	2.90	4.00	23.7%	0.9%	2.9%	72.4%
Local Responsibility	3.11	1.10	-0.20	0.20	-0.18	0.16	2.04	3.47	31.5%	5.2%	4.6%	58.6%
Non-expatriates	2.50	3.42	-1.32	0.84	-2.10	1.44	-0.26	7.21	47.4%	29.1%	20.0%	3.6%
OVERALL	3.38	2.97			-0.04	-0.01	0.46	3.49	85.2%	1.2%	0.4%	13.2%

wage systems as well as promotion systems demonstrate significant local effects. The wage system has 12.1% and promotion system has 10.2% positive local effects, which though are significantly neutralized by an otherwise passive evolutionary theory-based approach of learning-by-doing that Japanese corporations in general tend to take - as reflected in a negative 10.8% corporate effects on wage system and a negative 9% on promotion system.

It however appears that while Japanese MNCs have been able to successfully diffuse their skill-formation work organization and egalitarian productivity-based compensation system to Europe, they have not paid adequate strategic attention to gaining full commitment of their European workforce. Consequently, it has been difficult to translate the strong competencies into a strategic role of supervisor at the shopfloor, reflected in 3.4% negative local effects on supervisory system potential. The overall average hybrid ratio is 3.0, which on the hybrid evaluation scale reflects, "Most supervisors internally promoted; weak team management and weak process control functions (e.g. no active role in job rotation or multi-skill training; may have assistants for Industrial Engineering)".

The nature of the real problem can be better understood by analyzing hybridization dynamics in the participation system. It can be seen that local effects account for just 0.6% of the potential value of small group activities, indicating a virtual absence of any strategic efforts by the Japanese MNCs for revised application. The overall hybrid ratio is only 2.72 for the small group activities, which on the hybrid evaluation scale is equivalent to about 40% success in transferring Japanese-style small group activities (including suggestion schemes and meetings organized by supervisors) to Europe, with only a few systematic attempts on part of the company "to make the activities effective". This is despite the fact that corporations are aware of the significance of small group activities in their investment system reflected in 5.7% positive corporate effects. Still they tend to adopt a theoretical approach that promotes notions that small group activities can not be transferred to the Western nation, and as a result fail to cement the workforce devotion to the company. A look at the information sharing indicates additional presence of idealistic impediments, that promote thinking that voluntary involvement by the workforce should automatically be the case as corporate welfare is in the interest of the workforce especially under conditions of good internal workforce ladders. Despite the fact that European work-culture puts a premium on information sharing (Dankbaar, 1994), Japanese MNCs show a lack of strategic awareness about local dynamics. Consequently local effect on information sharing is a negative 8.9%, even though Japanese MNCs are aware of the strategic role of open communication in their overseas operations manifested in 2.4% positive corporate effects. As a result it is likely that the workforce tends to doubt the intentionality of management, because of the efforts of Japanese MNCs as regards broadness of job rotation that go beyond the local customs. Therefore the MNCs have to compensate through active investments in institutional devices and arrangements such as company uniforms for all employees, open parking, social events, morning ceremony etc. These devices lack any substantive content, and as such can at best ensure a parallel-order commitment of the workforce, and at worst might alienate most capable employees who are more interested in hard facts. Therefore there tends to be a costly co-evolution of institutions and technology in which Japanese MNCs make substantial investments in training and institutional

arrangements, in order to compensate for their idealistic and theoretical approaches towards participation-promoting activities.

What is the impact of such "costly human capital" on the core of investment system? European transplants demonstrate substantial positive local effects of 10.2% on maintenance. The average hybrid ratio for maintenance is 3.47, which is greater than 3.0 found in the Asian transplants; which means that while there is some commitment of the shopfloor workers to maintenance, such commitment is not sufficient for gaining their devotional involvement in preventive maintenance tasks. As a result MNCs are forced to compensate the maintenance role of workers by in addition relying on the experienced workers specifically hired for such role.

The gains in maintenance relative to Asian case are however neutralized by a negative local effects of 14% on equipment kaizen. The gains in quality control are marginal at 1%, while the effects on operations management are only 2.9%. The average hybrid ratios are somewhat better than the Asian case, but still are only 3.39 and 3.47 respectively - implying substantial need for the specialist in-process inspection along with an independent quality inspection department, and problems in appropriately adapting Japanese work and equipment kaizen knowledge to the local conditions. This suggests that the weaknesses in shared information are in specialized aspects of quality, signaling that the real causative factor in the proficiency of technology transfer is neither "rational expectations" of what should be done ideally, nor the "tacit transfer" based on spillover of knowledge from Japanese expatriates to the local workers. Rather the real source of strength is the "networking" or group interaction — wherein each worker chips in one's own distinctive expertise, so that the resulting overall pool of know-how can help solve the problems jointly even when the individual workers are unable to solve these problems. Due to a low emphasis on small group activities in Europe, the integrative higher-order responsibilities assigned to the local subsidiary would also be negatively affected.

The authenticating evidence for the above is shown by the industry effects. Industry effects are most negative in the management system, adversely affecting its potential by 16.6% on an average. Industry effects significantly (i.e. by 29%) enhance the use of Japanese expatriates relative to that of local employees. In addition they adversely affect the assignment of local responsibilities by 5.2%, even through the negative effect on authority delegation is only 0.9%. The industry effect on job classification is quite low at 0.2%, but effects on education and training as well as job rotation are quite substantial at 6.7% and 8.4%. Thus organization system is characterized by strong ascending-order linkages. Because of favorable conditions, there are strongly positive industry effects of 11.8% on the wage system - demonstrating the reason Japanese firms especially in the automobile industry have found it beneficial to boost their European investments at a rapid pace as compared to their investments in other regions (Fujimoto et al., 1994). However a weaker workforce commitment is reflected in descending-order degradation of administration system, with only 6% local effects on promotion system and only 0.3% effects on supervisory system.

The dominant causative factors are shown in the participation system that has 0.8% average negative industry effects. The small groups have a negative 8.3% and information sharing has a negative 0.6% industry effects. The firms try to compensate this with mechanisms for sense of unity with industry effects of positive 4.7%

but without much success. The industry effects on both quality control and operations management remain fully neutral, while adversely affecting equipment kaizen. The only stimulating effect is on maintenance at 8.9%. On the whole because of a weak backward linkage in the participation system at only 1.8% of local effects, the firms are forced to compensate with additional 33.6% investment of their management power in Europe. The rapid increase in European investments therefore threaten significant hollowing-out of Japanese management power over the next decade.

The significant slowdown and increasing "maturity" of the Japanese economy in the 1990s might also be partly due to a rapid growth of the above-type of Japanese investments in Europe, especially the UK, since the late 1980s.

Japanese Investment System in America

The management system of America, just like the Asian and the European cases, is characterized by a high local effect at 31.3%. As compared to the other two regions, however the gap between delegated authority and local responsibility is interestingly much lower. The local effects of 65.9% on delegated authority are about same as in Asia (65.9%); while 58.5% local effects on local responsibility are about same as in Europe (58.6%). Thus Japanese MNCs as a whole have a lower expectation of investment proficiency from their American transplants because of the perceived differences in cultural system, and so despite higher technological base of America the expectations are at the Asian level. On the other hand they have been able to actually assign responsibilities of a level realized in Europe. In fact this has been achieved with a negative local effect of 3.3% on the need for Japanese expatriates. It thus appears that Japanese multinational corporations have in fact been able to create a "supreme investment system" in the US, as against only a "super investment system" with neither dynamic competencies (reflected in high turnover rates as shown in Gupta and Abo, 1995) nor dynamic devotional intensity in Asia, and only a "supra investment system" with only semi-dynamic competencies (and emotional intensity) without any devotional intensity in Europe. It would therefore be interesting to investigate the causative factors in success of Japanese multinationals in the US.

The distinctive characteristic of the American organization system is presence of strong demarcation consciousness, and the resulting institutional rigidities in flexible utilization of workforce (Abo, 1994). As a result, local effect on flexible job classifications is negative at 11.8% or -0.70. At the top of these rigidities, there is a strong distrust between the workforce and the management in the American work-culture system. Therefore there is a lack of willingness to accept education and training, unless specific compensation is provided. This is reflected in 14.7% negative local effects on strategic education and training policies of the corporations. Finally because of poor conditions for formal training policies, the job rotation is equally impeded with very limited scope for any informal systems also, amidst union agreements and other behavioral inflexibilities on the part of workforce. This is reflected in a 14.2% negative local effects on job rotation. Then how come despite such a weak human capital core, the Japanese MNCs are able to realize a supreme liquidity of management power in their American investments? This requires investigation of the administration system, while noting an ascending order of diminishing negative local effects from job classification to job rotation in the organization system.

Table 1 (c) Japanese Investment System Potential in US

Asia Hybrid Sub-Systems	Current Hybrid Ratio	Japan Effect	Uncorrected Industry Effect	Uncorrected Corporate Effect	Industry Effect	Corporate Effect	Local Effect	Potential Hybrid Ratio	Japan Potential	Industry Potential	Corporate Potential	Local Potential
Production	3.31	3.34										
Maintenance	2.56	2.94	-0.35	0.37	-0.34	0.41	-0.44	4.13	71.1%	8.3%	9.8%	10.8%
Quality Control	3.33	3.29	0.01	-0.06	0.00	-0.03	0.07	3.39	97.1%	0.1%	0.8%	2.0%
Operations Management	3.44	3.40	0.01	-0.02	0.01	0.01	0.03	3.44	98.6%	0.4%	0.3%	0.8%
Equipment	3.89	3.74	0.03	-0.06	0.02	0.01	0.12	3.89	96.1%	0.5%	0.2%	3.2%
Participation	3.19	3.31										
Small Group	2.67	2.79	-0.13	0.19	-0.14	0.26	-0.24	3.43	81.4%	4.1%	7.5%	7.1%
Information Sharing	3.56	3.63	-0.01	0.07	-0.02	0.14	-0.19	3.97	91.4%	0.4%	3.4%	4.8%
Sense of Unity	3.33	3.52	-0.13	0.20	-0.14	0.28	-0.33	4.26	82.6%	3.3%	6.5%	7.6%
Organization	2.63	3.17										
Job Classification	3.22	3.96	-0.77	0.68	-0.67	0.63	-0.70	5.96	66.4%	11.2%	10.6%	11.8%
Education & Training	2.33	2.79	-0.29	0.42	-0.30	0.45	-0.61	4.14	67.4%	7.1%	10.8%	14.7%
Job Rotation	2.33	2.75	-0.27	0.38	-0.29	0.44	-0.57	4.06	67.8%	7.1%	11.0%	14.2%
Administration	2.85	3.09										
Wage System	2.22	2.92	-0.78	0.68	-0.77	0.71	-0.63	5.02	58.1%	15.3%	14.1%	12.6%
Promotion System	3.00	3.27	-0.28	0.31	-0.30	0.35	-0.33	4.25	77.0%	7.0%	8.3%	7.7%
Supervisory System	3.33	3.08	-0.02	0.24	-0.02	0.28	-0.01	3.40	90.6%	0.7%	8.4%	0.3%
Management	2.85	1.82										
Authority Delegation	2.89	0.95	0.01	-0.01	0.01	-0.07	1.99	3.03	31.4%	0.5%	2.3%	65.9%
Local Responsibility	2.78	1.10	-0.08	0.10	-0.07	0.05	1.70	2.91	37.7%	2.2%	1.6%	58.5%
Non-expatriates	2.89	3.42	-0.75	0.51	-1.27	0.93	-0.19	5.81	58.8%	21.8%	16.1%	3.3%
OVERALL	2.99	2.97						3.56	83.4%	7.5%	8.5%	0.6%

The administration system demonstrates an equally negative local effects on wage system valued at 12.6% of the total potential. The negative local effects in promotion system are only marginally more comforting at 7.7%. Still supervisory system is much better with only 0.3% negative effects. Just like the organization system, the administration system as a whole shows a strong ascending order - with little if any evidence of any backward linkages from the Japanese firms in human capital formation. Still the core organization and administration systems together just ensure a parallel order performance - a simple "investment system". One therefore needs to investigate how such hollow factory is able to realize a supreme proficiency.

The participation system shows that the theoretical notions of individualistic society and cultural differences of Anglo-Saxon nations in fact are much more deep rooted in respect of the US than of Europe. As a result the firms avoid making any investments in small group activities, with negative local effects amounting a high of 7.1%. They also avoid sharing systematic information, with negative local effects of 4.8% more than overwhelming positive corporate effects of 3.4%. Neither do they make much investments in sense of unity, with negative local effects amounting to 7.6% of the total potential. As a whole investments in participation system are reduced by 6.5% because of the negative local effects, more than compensating for the positive 5.7% network-wide spillover investment effect from the corporation. Thus savings in the participation system improves the investment proficiency to a level of "super investment system". Abo (1994) shows that such savings primarily arise due to the strong efforts of the Japanese firms to locate their transplants in the areas of high unemployment and to avoid the unionization of their workforce, so that a comparatively greater performance flexibility can be enjoyed by the Japanese transplants relative to the local companies.

The production system, the core of investment system, experiences a average 1.6% negative effect of the local factors. The negative effect is rooted in maintenance, as local effects reduce the development of internal maintenance personnel or even the assignment of routine maintenance responsibilities to the workforce. The positive effects on quality control at 2% and on operations management at 0.8% are also marginal. However there is a significant positive effect on export of equipment from Japan to the US at 3.2%, in contrast to a negative 14% effect in Europe and negative 0.7% effect in Asia. As Japanese firms make a profit on export of equipment to the US, it is clear that this is the source for boosting the proficiency of their investment system from super to a "supra investment system".

Finally, this explains the dynamics of American management system. As Japanese MNCs have a very low expectations from their American transplants, they tend to assign fewer and less difficult tasks to their local subsidiaries and try to automate most activities by transfer of post-kaizen Japanese equipment. The residual tasks are within the competencies of the local workforce, and so they are able to carry out their responsibilities continuously even without any skill upgradation. Further local workforce in the US staunchly refuses to take any additional authority, by insisting upon clear job specifications. In addition it restricts any attempts by the Japanese MNCs to use their discretionary power to encroach upon delegated authority, by openly revolting against any tactical interventions on the part of management. The local workforce also is strongly against any suggestions by the Japanese companies through direct investments of expatriates. Therefore Japanese MNCs are able to

save their management power costs through an evolutionary approach of "active adaptation" of their human-based methods. This cost saving is in contrast to a descending-order investment of management power in Asia and parallel order investment of management power in Europe. These cost savings facilitate a quantum jump in investment proficiency from supra to "supreme investment system".

The "flexible specialization" model of Piore and Sabel (1984) predicts that the residual role performed by the other nations imparts a strong dynamism to the focal nation, for it can focus on the higher-tech activities and use the periphery for the mass production support under conditions of boom. Yet the Japanese experience suggests that in the emerging cut-throat global competition, the exogenous-shocks are more likely to encourage a shift of activities to a third location (i.e. the UK), even if the firms lack initial networks in such location. The dynamic modeling by Gupta and Fujimoto (1995) in fact demonstrates that the high export intensity of the Japanese firms is the primary source of yen appreciation, contrary to the orthodox beliefs, and that the trade imbalances have reduced the attractiveness of Japan as an investment-base.

6. Common Denominator for Japanese Investment System

Table 2 shows that at an aggregate level, overall corporate effect on all the 16 parameters of the investment system is positive, accounting for 0% effect in quality control to 3.1% effect in job rotation. The greatest item-level corporate effects lie in management system - with 68.1% effects on authority delegation and 56.7% local responsibility assignment, with about 11% expectation-capitalization gap (as against 7% gap in the US, 13% gap in Europe and 30% gap in Asia). This 11% gap may be referred to as the servicing gap in Japanese investment culture. The main causative factor for this 11% gap is revealed in the negative industry effects on all the parameters of investment system, except delegation of authority and assignment of local responsibility. The average industry effect is -0.04 , while the average corporate effect is 0.25 ; signaling that the specific portfolio of activities assigned to the local subsidiaries and workers have a negative impact of 16% on the firm-specific know-how of the Japanese MNCs. The orthogonality of delegated authority to the industry suggests that there is no systematic correlation between the technology and the organizational design; while the 0.01 positive local responsibilities signal the contribution of local customs and heuristics to the "revised adaptation" of Japanese technology. It is only in relation to the management system, that the Japan-effect is least, the corporate effect is the greatest, and that the industry-effect does not have a sign opposite to the corporate-effect. This signals that a strong role of an overall strategic awareness of the local ground realities in the investment proficiency. An inappropriate organizing technology impedes flexible coordination with the home and the global networks of the Japanese MNCs upgradation in Japan.

These findings suggest that essential causative factor in the "flying geese" pattern of Japanese development was the strong linkages of Japanese technology and organization system with the overseas cultural systems, nurtured immediately after the World War II (see Gupta, 1996). Such strong technical linkages provided the necessary condition for the backward linkages of importing higher-tech technologies from the US and Europe, and the forward linkages of exporting lower-tech technologies to the Asia. As such linkages have weakened, the Japanese firms are now finding it increasingly difficult to outsource their costly parts to other nations.

Table 2 Common Denominator for Japanese Potential Investment System

Local Hybrid Sub-systems in Europe	Current Hybrid Ratio	Japan Effect	Industry Effect	Corporate Effect	Potential Hybrid Ratio	Industry Potential	Industry Potential	Local Potential
Production	3.34	3.34	-0.01	0.02	3.37	99.2%	0.4%	0.5%
Maintenance	2.94	2.94	-0.03	0.03	3.01	97.8%	1.1%	1.1%
Quality Control	3.29	3.29	-0.00	0.00	3.29	99.9%	0.0%	0.0%
Operations Management	3.40	3.40	-0.00	0.00	3.40	99.9%	0.0%	0.0%
Equipment	3.75	3.74	-0.01	0.02	3.78	99.0%	0.3%	0.7%
Participation	3.31	3.31	-0.01	0.01	3.34	99.2%	0.4%	0.4%
Small Group	2.79	2.79	-0.01	0.01	2.82	99.0%	0.5%	0.5%
Information Sharing	3.63	3.63	-0.01	0.01	3.64	99.6%	0.2%	0.2%
Sense of Unity	3.52	3.52	-0.02	0.02	3.56	98.9%	0.6%	0.6%
Organization	3.17	3.17	-0.07	0.07	3.31	95.7%	2.2%	2.2%
Job Classification	3.96	3.96	-0.07	0.07	4.10	96.6%	1.7%	1.7%
Education & Training	2.79	2.79	-0.05	0.05	2.90	96.3%	1.8%	1.8%
Job Rotation	2.75	2.75	-0.09	0.09	2.93	93.8%	3.1%	3.1%
Administration	3.09	3.09	-0.03	0.03	3.16	97.9%	1.0%	1.0%
Wage System	2.92	2.92	-0.07	0.07	3.06	95.2%	2.4%	2.4%
Promotion System	3.27	3.27	-0.02	0.02	3.32	98.6%	0.7%	0.7%
Supervisory System	3.08	3.08	-0.00	0.00	3.09	99.9%	0.1%	0.1%
Management	2.98	1.82	-0.06	1.22	3.09	58.9%	1.8%	39.3%
Authority Delegation	2.54	1.10	0.01	1.44	2.54	43.1%	0.2%	56.7%
Local Responsibility	3.42	3.42	-0.18	0.18	3.77	90.7%	4.7%	4.7%
Non-expatriates	2.98	0.95	0.00	2.03	2.98	31.9%	0.0%	68.1%
OVERALL	3.19	2.97	-0.04	0.25	3.26	91.1%	1.1%	7.8%

Therefore Japanese firms are being forced to use the costly technical expertise of Japanese expatriate. This management power is directed mainly to motivate local workforce in form of inflationary wages that are 2.4% above the contribution of workforce, disproportionate non-egalitarian promotion that raises corporate cost 0.7% above the potential of workforce. The workforce raises the machine cost by 0.7% because of lower kaizen activities, which is then supported by a 1.1% additional cost in maintenance system to keep the operations running in order to meet the market requirements. To ensure overall profitability of overseas operations, Japanese MNCs try to save money in organization system (3.1% lower investments in job rotation for multi-skilling, 1.8% lower investments in education & training and 7% lower investments in job classification) and in participation system (0.5% lower investments in small group activities, 0.2% lower investments in information sharing, and 0.6% lower investments in sense of unity) which are the real foundations of their competency and commitment building-blocs. This is the main causative factor for the ongoing hollowing-out of Japanese technological base through its overseas investments.

7. Conclusions

The findings from the dynamic modeling demonstrate that the Asian work-culture places a strong value on the utilization of local heuristics in improving the new technologies, and on the experiential training that fills the gap between local customs and the available technical knowledge. In contrast the Japanese work-culture emphasizes the complete assimilation of the external knowledge with the historically evolved technological endowments and cultural norms. The European work-culture generally tends to make a heavy use of information-support systems for integrative networking of group-knowledge, such as centralized computer-supported analysis of best-technique and dissemination of such information to the decentralized local workers. In contrast the Japanese work-culture relies primarily on the human interactions for networking the knowledge, and so most Japanese MNCs have only weak computer-assisted knowledge integration in their home operations. The American work-culture strongly favors a residual role of the workforce, with the technological driver being the development of machinery. In contrast in the Japanese work-culture there is a strong emphasis on the driving role of workforce, with machinery taking a residual role through incremental kaizen and upgradation.

In each region, the "rational" logic employed by the workforce is rooted in the sentimental beliefs about the "idealism" of one's own cultural heuristics, so that there tends to be a gap in networking of a truly hybrid and most proficient universal approach. It is the strategic awareness of these local dynamics, and a strategic priority on "revised adaptation" of Japanese technology to local customs, that determines the Japanese investment proficiency. As even the best of Japanese MNCs focus at most on "revised application" of their own principles, the "first-step" of nurturing a complete emotional involvement and commitment of the local workforce to the MNC remains very difficult. The evidence indicates that the Japanese firms face particular difficulties in bridging the inter-cultural gap. A similar dynamics could also explain the weaknesses of the Japanese firms in non-incremental innovations, for if the upper management strongly believes in the idealism of the firm's historical heuristics, then it might not provide sufficient channels for blossoming the entrepreneurial creativity of the younger generation. In contrast, when the

younger managers are given just a direction and allowed full freedom, then significant innovations can occur as confirmed by the 1978 "Tall Boy" innovation of Honda. Therefore it can be concluded that the key to success lies in true appreciation of the fact that "*We are the makers of our mood and our destiny*".

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