

*Hypothesis Formation for Development of a New Management Paradigm:
Analysis of Japanese Foreign Subsidiaries' Adaptation of Information Technology*

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1. Preface

This paper presents an attempt to analyse the formulation of the evolving new management paradigm, which may be conceived as a mixture or hybrid of both (1) IT (information technology) enforced management and (2) traditional Japanese style management. The concept of a new management paradigm is explained firstly. Secondly PC usage in the office environment is discussed. Then, the adaptation of PCs in Japanese subsidiaries is examined through analysis of a pilot survey recently undertaken in the UK. Next, possible research objectives for the analysis of a New Japanese Business Paradigm are presented. Determinants of the firm's IT adaptation and its effects are then discussed. Finally, basic factors of potential hypotheses are introduced.

2. Searching for a New Management Paradigm

As a consequence of ongoing expansion and development of information technology (IT), the usage of PCs within firms has become ever more extensive, spreading from office usage, to production, sales, and so on. Major benefits of IT

usage include potential cost reduction of both (1) processing data and (2) communicating inside/outside of the firm. In order to respond to the business sector's need to cope with increased market pressures and to sustain profitability, implementation of IT involves various types of communication which are broadly classified as *firm-internal and firm-external communication* [Takagaki 1999]. The cost of such communication can be classified as a type of "transaction cost" in accordance with the category of transaction cost as explained and developed by Coase [1937] and Williamson [1975]. Currently, most Japanese firms are still struggling to find a new paradigm whereby the Japanese management system can be implemented through information technology [Bensau and Earl 1996]; however, it is proposed here that one possible breakthrough in the formulation of such a paradigm may be found within the investigation of IT adaptation by Japanese overseas subsidiaries [Takagaki 1999], many of which have already experienced a synthesis of Western working style and Japanese management without the abandonment of the respective key values of

those two systems. It is suggested that because of their distance from the home office and also their existence within a different language domain, subsidiaries have greater incentives than the home office for cost reduction through the introduction of IT. If Japanese subsidiaries are successful in developing a new type of management as a consequence of the introduction of IT, this new management system may become the searched-for, viable paradigm which can be applicable to both Japanese firms and Western firms. Reference is made here to a pilot survey on PC usage in office work in which it was found that Japanese subsidiaries in the UK are more active than the home office in the use of PCs for office functions [Takagaki 1998].

3. PC in-office usage

Various kinds of PC software are used according to the endless varieties of information, and the style of IT usage is different from industry to industry and from office to office. However, the adaptation of PCs in the Japanese office is not so common as it is in the companies' production site, logistics and sales divisions. In daily business, office personnel use PCs and communicate through E-mail as easily as by phone or fax. In Japan, the cost of telephone communication is certainly not negligible, even though costs have been reduced through

privatisation of the national telephone company and subsequent increased competition. Recently, many Japanese firms have begun introducing the E-mail system for office usage and have then connected with overseas branches.

Following introduction of IT such as the E-mail system, communication costs can be reduced drastically. Some firms have also introduced TV conferencing by using PC software. Such changes suggest that as communication within a firm changes, business styles will also change. Furthermore, a firm's corporate strategy or organisation must necessarily change rapidly as a consequence of the introduction of IT such as E-mail and TV conferencing. It is therefore yet to be seen whether Japanese firms can maintain and enforce their management system through the introduction of IT without having to weaken or abandon the strengths of the Japanese management system.

As mentioned above, for the reason of low price and ease of operation, the usage of PCs in firms is rapidly expanding not only in office usage but also in production, sales and so forth. Indeed, one of the major reasons that a firm introduces information technology is for cost reduction in such areas as communication cost, labour cost, and so forth. In this regard, the major benefit may be cost reduction of (1) processing data, and (2)

communicating inside/outside of the firm (firm-internal and firm-external communication). In a foreign operation, however, a firm faces increased communication cost because of (1) geographical distance, and (2) cultural distance.

The effect of geographical distance on the cost of communication is readily perceived, and the cost of communication between parent headquarters and the subsidiaries is demonstrably greater than that between the parent headquarters and the home branches. However, less conspicuous, perhaps, is the effect of cultural distance and the added cost of the foreign subsidiary's need to communicate with local suppliers and consumers whose background, culture, and education is likely to be substantially different from what is familiar to the firm in the home country. These differences affect not only the costs of communication within the host country of the subsidiary, but also increase the cost of communication between the subsidiary and the home country. Because cross-cultural communication entails greater costs than same-culture communication, the introduction of IT by the foreign subsidiary may result in proportionately greater cost reduction than what would be experienced by the parent company in the home country.

It is probably expedient to focus on the subsidiaries' usage of PCs because, as

explained here already, the effect of cost reduction is likely to be more significant among the subsidiaries than in the home office. Moreover, the effect of cost reduction is likely to be most apparent for the office usage of PCs in foreign subsidiaries because the communication cost is higher in the foreign operation and therefore the effect of cost reduction by introducing PCs is significantly greater than that observed in the home countries. Furthermore, the introduction of new IT is rather easier than in the home countries because the organisation of subsidiaries is generally comparatively small and their decision to introduce IT into the firm is reached more easily and quickly than in the larger organisation in the home country.

Among various kinds of information technology, PC usage in Japanese subsidiaries in the UK was selected as the focus of our research because usage of the PC is rapidly developing in offices in both Japan and the UK. Among European countries, Japanese FDI is most active in the UK. For most Japanese office workers, English is their first foreign language. This is because educational policies in Japan have assured that English is the first and principal foreign language of Japanese office workers. But even under conditions of optimal language proficiency, there remain substantial cultural differences between Japan

and the UK. Therefore, a comparison of PC usage in the Japanese firms' offices in Japan and in the UK is expected to provide valuable information regarding cost reductions and benefits associated with PC usage.

4. Adaptation of PCs in Japanese Subsidiaries in the UK

In order to explore the extent of cost reduction and perception of benefits of PC usage in the office environment, PC usage in Japanese subsidiaries in the UK has been investigated [Takagaki 1998]. In the spring of 1997, a questionnaire-based survey was conducted covering 375 Japanese subsidiaries in the UK and the preliminary results are summarised here.

There were 46 responses received (12%). Items of inquiry included: (1) PC users in the office, (2) evaluation of PC, and (3) office worker's capabilities and qualifications. Additionally, (4) follow-up interviews with selected Japanese firms were conducted and are summarised here.

(1) PC users in the office

(Refer to Table-1)

The total number of office workers (both managers and staff) in our sample of subsidiaries amounted to 3,154 (average 68.6 per subsidiary). The results show that PC usage ($461/550=83.8\%$) among managers is higher than that of staff ($1,643/2,604=63.1\%$, including part-

time office workers). Almost 60 percent ($=326/550$) of managers are active in using E-mail although E-mail users among staff are 44 percent ($=1,166/2,604$). On the other hand, considering only the PC users, there is no significant difference in the percentage of managers and staff who use E-mail (70.7% for management, $=326/461$; 70.9% for staff, $=1166/1643$). However, there is substantial difference in the percentage of Internet users: 24.7 percent ($=136/550$) among managers and 11.7 percent ($=305/2,604$) among staff. As a percentage of PC users, that is 29.5 percent for managers ($=136/461$) compared to 18.6 percent for staff ($305/1643$).

According to a NIKKEI survey [1998] on IT usage among large firms in Japan, PC usage among office workers is 83.7 percent in 1997 (65.8 percent in 1996). Although 62.1 percent of PCs were connected with some networks in 1997 (40.4 percent in 1996), the number of E-mail users was 31.5 percent for office workers (14 percent in 1996), and that of internet users was 24.2 percent for office workers (8.6 percent in 1996). Although PC usage in office such as E-mail and Internet showed rapid increase in 1997, E-mail communication was not so popular among the older managers.

This may suggest that business conditions in the UK enhance E-mail communication or that the need for

communication, with both the home country and within the local area, is greater for the managers of foreign subsidiaries than for those in the home offices.

(2) Evaluation of their own PC usage

(Refer to Table-2)

Cost reduction of both (a) labour cost and (b) working area needed for filing and storage are highly evaluated among the subsidiaries, and this is similar to the position of firms in Japan. Similarly, reduction of information cost is also highly evaluated. However, improvement of communication (vs. telephone) is acknowledged but not so strongly supported. This implies that although PCs are seen as convenient, the telephone is viewed as superior because of the desire for voice communication or instantaneous, interactive communication. Additionally, the benefit of reduction of travel costs is not so strongly evaluated. This implies that face-to-face communication remains of considerable importance for business communication, either for reason of direct benefits or for reasons of the attraction of travel.

In terms of the future expansion of PC usage, the subsidiaries highly evaluated (a) increasing training, (b) upgrading the level of PC usage, and (c) expanding the number of PCs. Surprisingly, however, the value of hiring PC-skilled

labour is recognised but not strongly supported. Outsourcing is also not evaluated positively, meaning that the firms hope to internalise their knowledge of PC usage.

(3) Office worker's capability

(Refer to Table-3)

Although the worker's capabilities of (a) logical thinking, (b) written expression, (c) visual presentation, and (d) data-acquisition are highly evaluated, other skills, such as (e) typing ability and (f) mathematical and computational ability are not so highly evaluated, nor is (g) prior PC-experience. This is similar to the results found in Japan [Takagaki 1996], and it implies that the firms may prefer knowledgeable (collegiate-level) office workers to the standard skilled office workers.

(4) Additional Interview

(Refer to Table-4)

Based upon the results of questionnaire survey, additional interviews with selected Japanese subsidiaries were conducted. Additional research topics are not only on office usage but also in other divisions, such as production site and sales divisions. Our findings are (1) PC usage is helpful for the foreign operation from production through sales, (2) communication among similar job groups in Japan and in the US is rapidly spreading.

Furthermore, (3) technological development in production in subsidiaries in the UK can involve co-operation with the relevant R&D division in Japan, and (2) sales people can concentrate on local marketing because the logistic aspects of their work are typically reduced with utilisation of PCs.

(5) Summary of PC Adaptation

From a pilot survey on PC usage in office work, it was found that Japanese subsidiaries in the UK are more active than the home office in the use of PCs for office functions such as E-mail. Cost reduction is highly evaluated by those users. This implies that their working style is already significantly different from that of the headquarters. This change can be a trigger of further change of boundary and organisation of foreign subsidiaries. Additionally, the firm's governance may also change, particularly if doing so can increase their competitive advantage in the local (host-country) market.

5. Possible research objectives for New Japanese Business Paradigm

Recent decades have witnessed Japan's international expansion, not only in terms of seeking new markets or larger market share in foreign markets, but also in terms of initiating and developing overseas manufacture of Japanese

products or of products imported by the Japanese. There have also been significant changes world-wide in both political and market relations between countries. With all of this, Japanese workers and management have also expanded their encounter and experience with diverse cultural patterns. And beyond the need for ever more rapid adaptation and accommodation to these new influences, there has also been the need to adjust to the even more rapidly changing technology. Within all of this, Japanese firms have realised that in order to remain competitive it is necessary for them to find and establish a new paradigm by which the Japanese management system can be implemented through information technology.

It is proposed here that the formative essentials of such a new paradigm can be identified by giving close consideration to the activities of Japanese international organisations, comparing the subsidiaries with the home office.

Possible research objectives are presented here in outline form, and summarised in Table 4:

- (1) To determine if there is evidence that subsidiaries are more active in application of IT than the home office.
 - a) Which area(s) of the organisation are most affected.
 - b) What actions have brought about this situation.

- (2) To determine if there is any evidence of strategic or organisational change in the subsidiaries.
- a) Whether IT introduction/utilisation has influenced the change.
 - b) Whether the change has influenced IT introduction/utilisation.
- (3) To determine if there is any evidence indicating strategic or organisational change in the home country.
- a) Whether IT introduction/utilisation has influenced the change.
 - b) Whether the change has influenced IT introduction/utilisation.

With the above research objectives in mind, it is possible to present some tentative hypotheses in order to determine what affects a subsidiary's positive action towards the introduction of IT and/or IT adaptation, and how such introduction/adaptation may bring about strategic changes within the subsidiary. Furthermore, it is desirable to determine the corresponding changes in the home country.

6. Determinants of firm's IT adoption and its effects

When we consider the determinants of a firm's adoption of IT and its effect, we should consider three characteristics: (1) the parent firm in the home country, (2) the subsidiary in the host country, and (3) the location of subsidiaries in the host country. The strong points of the

parent's characteristics are sometimes understood as 'firm-specific-advantages' (or 'ownership advantages', or 'core competence') which comprise the resource of the firm's competitiveness with others. According to 'Internalisation theory', the firm may internalise when it enters into foreign operation. The degree of internalisation can be observed as business territory, or as the boundary of the firm. The condition of the host country is also reflected to the international business strategy. The characteristics of the subsidiary are determined by both the parent and the local conditions.

(1) Characteristics of the parent firm

The characteristics, of course, include features such as the age of the firm itself, the scale of the firm, financial bases, intensity of R&D, market-orientation, capital/labour ratio, width of international business, and international business experience, etc. Among those, technological knowledge (R&D intensity) and marketing skill are often treated as the firm's competitive advantage.

Setting aside the differences among industries (IT users or IT suppliers), knowledge accumulation in the firm both influences and is influenced by the adoption of IT. Specifically, a firm which has experienced a mainframe computer system tends to exhibit a hierarchical

organisation. Based upon Nolan's "stage model" analysis [1979] the history of IT usage has four stages. During the first, second, and third generations, the greater the size of the system, the greater the cost of the computer, as predicted by Grosch's Law. Therefore, in the past, most firms invested into centralised computer systems for the reason of cost effectiveness. However, the demerit of centralised systems is the low flexibility of system change as a consequence of the scale of the system. Nonetheless, it should be remarked that such comparatively powerful but inflexible systems were apparently well matched to organisations which themselves were characteristically hierarchical and central.

Other features can be identified as characteristics of the firm, but concern here will be limited to four categories: (1) consumer vs. durable products, (2) intermediate vs. final products, (3) assembly vs. process production, and (4) vertically-integrated vs. horizontally-integrated structure.

(2) Characteristics of the subsidiary

The second feature can be identified as the various characteristics of the subsidiary. The ownership strategy (wholly owned or joint venture) is a typical and significant characteristic of subsidiary. The business territory of the subsidiary

is also sometimes different from that of parent, in part because it is often restricted by local market conditions.

(3) Characteristics of location

The third group of features can be identified as various characteristics of the location of the subsidiary. These are conditions which reflect conditions of the local market, business habits, culture, language, etc.

7. Basic factors of the potential hypotheses

Possible research objectives are proposed and the basic factors of potential hypotheses are introduced as follows and summarised in Table-5.

(1) Factors influencing IT introduction/usage :

H11: Global parent firms have positive attitude to IT introduction in their subsidiaries because they need world-wide communication channels.

The global parent has to communicate with many foreign subsidiaries and there is need for inter-communication. Local subsidiaries also need to communicate with the parent and other subsidiaries. These needs provide great incentives to reducing communication cost by introducing IT.

H12: Technologically advanced parent

firms have a positive attitude to IT introduction in their subsidiaries because they have high knowledge capability for IT usage.

They have a lot of experience in knowledge, and have developed the need to communicate, collect, and analyse substantial amounts of information. IT is a good vehicle of managing their knowledge.

H13: Parent firms having advanced level of marketing have a positive attitude to IT introduction in their subsidiaries because they have high knowledge capability for IT usage.

H14: IT manufacturing firms have positive attitude to IT introduction in their subsidiaries because they have high capability for IT usage.

(2) *Factors influenced by IT introduction/usage :*

H21: By introducing IT to their business, firms can expand their foreign business.

H22: By introducing IT to their business, firms' decision making can be decentralised.

8. Analytical Framework and Future Analysis

In an effort to focus on the degree or depth of usage of computer-assisted or network technology in Japanese MNE subsidiaries, it is possible to look at IT as a strategy for information cost reduction. Using the degree or depth of usage of information technology as a dependent variable, and the firm's characteristics as explanatory variables, one can test the validity of the hypotheses given above. The effect or change in the subsidiary can be determined by using the degree or depth of computer-assisted, or network technology as an explanatory variable, and the changes in the firm's business style as a dependent variable.

As explained here, a systematic comparison of the introduction and utilisation of IT by Japanese firms with foreign subsidiaries, comparing conditions and usage in the subsidiaries with conditions and usage in the home office or branch offices in the home country, should provide substantial information that will be significant in the determination of a new paradigm for Japanese business.

TABLE-1 PC users in office

(in UK)

		Firms	Workers	Average
Managers		46	550	12.0
Full-time staff		46	2,477	53.8
Part-time staff		46	127	2.76
Managers+Staff		46	3,154	68.6
PC users	Man-agers	46	461	10.0
	Staffs	46	1,643	35.7
E-mail user	Man-agers	46	326	7.09
	Staffs	46	1,166	25.3
Internet user	Man-agers	46	136	2.96
	Staffs	46	304	6.61

TABLE-2 Evaluation for PC

(in UK)

Valuable for Improvement & expansion		Rating						Average	No. of Firms (Sum)
		SA	MA	LA	LD	MD	SD		
		1	2	3	4	5	6		
I	Reduce information cost	9	23	10	3	1	0	2.2174	46
M	Increase efficiency of labor	19	14	9	4	0	0	1.9565	46
P	Reduce area for filing and storage	7	19	12	3	5	0	2.5652	46
R	Reduce workspace	2	5	10	14	12	3	3.8261	46
O	Improve communication	7	10	11	6	9	2	3.1333	45
V	Reduce travel cost	1	3	17	14	7	4	3.7609	46
E	Increase number of PC	7	12	15	7	2	1	2.7273	44
X	Upgrade of PC	9	25	9	1	0	1	2.1333	45
P	PC training	14	20	11	1	0	0	1.9783	46
A	Hire PC-skilled labor	6	11	15	7	5	2	3.0000	46
N	Outsourcing	2	6	11	12	11	3	3.7333	45

Note : Symbols of rating are as follows,

SA : Strong agreement

LD : Less disagreement

MA : Moderately agreement

MD : Moderate disagreement

LA : Less agreement

SD : Strong disagreement

TABLE-3 Office Workers' Capability

(in UK)

Valuable Capability	Rating						Average	No. of Firms (Sum)
	SA	MA	LA	LD	MD	SD		
	1	2	3	4	5	6		
Typing ability	5	13	21	5	1	0	2.6444	45
Math. & computing	7	14	16	8	0	1	2.6304	46
Writing & expression	10	21	14	0	1	0	2.1522	46
Data-acquisition	8	20	13	4	1	0	2.3478	46
Visual-presentation	10	17	16	2	1	0	2.2826	46
Logical thinking	23	14	7	2	0	0	1.7391	46
PC experience	7	16	14	9	0	0	2.5435	46

Note : Symbols of rating are as follows,

SA : Strong agreement

LD : Less disagreement

MA : Moderate agreement

MD : Moderately disagreement

LA : Less agreement

SD : Strong disagreement

TABLE-4 List of Interviews

Group	Name of subsidiary, Location, Business etc.
CANON	Canon Manufacturing UK Ltd. Location: Fife Production: Ink jet printer, Copy machine (recycling)
RICOH	Ricoh UK Products Ltd. (RPL) Location: Telford Production: Copy machine Employee: 800
SHARP	Sharp Manufacturing Company of UK (SUKM) Location: Wrexham, Production: VTR, Electric Oven, Word processor Employee: 963
TOSHIBA	Toshiba Customer Product (UK) Ltd. Air Conditioners Division Location: Plymouth Production: Air-conditioners for commercial usage Employee: 280
EBARA	Ebara UK (Ebara Pump UK) Location: Heathrow Sales: Pump

TABLE-5 Research Objectives

- (1) To determine if there is evidence that subsidiaries are more active in application of IT than the home office.
 - a) Which area(s) of the organisation are most affected.
 - b) What actions have brought about this situation.
- (2) To determine if there is any evidence of strategic or organisational change in the subsidiaries
 - a) Whether IT introduction/utilisation has influenced the change.
 - b) Whether the change has influenced IT introduction/utilisation.
- (3) To determine if there is any evidence indicating strategic or organisational change in the home country.
 - a) Whether IT introduction/utilisation has influenced the change.
 - b) Whether the change has influenced IT introduction/utilisation.

TABLE-6 Possible Hypotheses

- (1) *Factors influencing IT introduction/usage :*

H11: Global parent firms have positive attitude to IT introduction in their subsidiaries because they need world wide communication channels.

H12: Technologically advanced parent firms have positive attitude to IT introduction in their subsidiaries because they have high knowledge capability for IT usage..

H13: Advanced-marketing parent firms have positive attitude to IT introduction in their subsidiaries because they have high knowledge capability for IT usage..

H14: IT manufacturing firms have positive attitude to IT introduction in their subsidiaries because they have high capability for IT usage.

- (2) *Factors influenced by IT introduction/usage :*

H21: By introducing IT to their business, firms can expand their foreign business.

H22: By introducing IT to their business, firms' decision making can be decentralised.

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