

EVOLUTION OF CORPORATE NETWORK:
COMPETING MODELS IN
THE EUROPEAN PERSONAL COMPUTER INDUSTRY

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This paper depicts the evolution of corporate network among leading firms in the European personal computer industry between 1977-99, and highlights the impact of national culture upon the emergence and the implementation of the traditional and the new American models in the industry. The traditional American model builds on the notion of firm capabilities and places strong emphasis on integrated backward linkage and the management of disintegrated forward linkage. The new American model, in contrast, is market oriented and advocates disintegrated backward linkage and integrated forward linkage. It is suggested that the different levels of individualism in societies, where US and Far East personal computer firms have originated, impinge on their conformity towards the American models of corporate network. During the 1980s, Far East computer firms with low levels of individualism conformed to the traditional American network endorsed by IBM whilst the youthful US firm Dell from an individualistic culture pioneered an alternative new model. The financial success of Dell has confirmed during the 1990s the new American model as the best practice corporate network. However, as suggested by the cultural thesis, the less individualistic Far East participants have demonstrated greater conformity to the new model than the historic US firms originated from an individualistic culture.

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Corporate network describes a set of linkages in relation to the flow of intermediate products and final products within or among firms, and can be differentiated into forward linkages and backward linkages¹. In the context of personal computer firms, forward linkages refer to the flow of final products such as desktop and notebook personal computers from assembly plants directly or indirectly to customers. Backward linkages, as a contrast, depict the flow of intermediate products such as semiconductor, storage, display... from suppliers to the plants. These linkages within a corporate network are organised in terms of two modes: disintegration and integration. Integration describes firms organising productive or marketing activities internally and substituting market transactions with inter-firm transactions. On the other hand, disintegration focuses on intra-firm transactions and relates to firms entering into contracts with independent suppliers or marketers.

This paper will describe the evolution of corporate network in the European personal computer industry between 1977 and 1999 and will provide a cultural explanation on the continuity and change in the industry. Though IBM's CEO Louis Gerstner in 1999 publicly declared that "the PC is dead", personal computer is still one of the most important manufacturing industry world-wide and with sales volume exceeding one hundred millions units during the year. The market research consultancy International Data Corporation stated that "the profound influence of the PC and the growth (era) is over. But it's still a big market. The PC business is still a sizeable, established business... PCs still lead to sales of services and other products"².

The evolution of corporate networks among leading personal computer firms in 1999, which includes Compaq, Fujitsu, Dell, IBM, HP, NEC, Toshiba, Apple, Acer and Gateway, will be discussed in the following sections. Table 1 shows that the aggregated European market shares of the ten industry participants were approximately 70% in 1999; in addition, this table highlights the importance of US firms Compaq, Dell, IBM, HP and Apple that had approximately 46% market shares. The significance of US firms can also be observed in important European markets such as the UK; Table 2 shows that they had 48% of the market shares in desktop personal computers in 1998.

Table 1
European Personal Computer Unit Market Shares, 1st quarter 1999

	Nationality	Market Shares
Compaq	USA	17.5%
Fujitsu-Siemens*	Japanese/German	12.6%
Dell	USA	9.3%
IBM	USA	9.0%
HP	USA	5.9%
Packard Bell NEC**	Japanese	4.7%
Toshiba	Japanese	4.0%
Apple	USA	2.9%
Acer	Taiwanese	2.7%

* Fujitsu-Siemens was formed in October 1999. As the joint venture signified Siemens' exit from the loss making personal computer business, its corporate network will not be covered in this paper. (FT 18 Jun 1999 p33).

**NEC's involvement in personal computer relates to its 95.6% equity stakes in NEC Computer International, which was formed in November 1999. Groupe Bull owned the remaining 4.4% shares

Source: Context as quoted in Wall Street Journal 17 June 1999 A21.

Table 2
UK Desktop Personal Computer Unit Market Shares, 4th quarter 1998

Compaq	16.8%
Dell	12.8%
Packard Bell	11.4%
Tiny Computers	7.5%
IBM	6.1%
Hewlett-Packard	4.4%
Time	3.9%
Gateway	3.8%
Apple	3.7%
Fujitsu	3.0%
Acer	2.6%

Source: Dataquest as quoted in PC Pro August 1999 p77.

The theoretical basis of corporate network can be traced to Coase (1937)'s notion of market and hierarchy; Coase (ibid p388) stated that: "outside the firm, price movements direct production, which is coordinated through a series of exchange transactions on the market. Within a firm, these market transactions are eliminated and in place of the complicated market structure with exchange transactions is substituted the entrepreneur coordinator, who directs production". Following the Coasian tradition, the major theory that explains the configuration of corporate network has been focused on transaction cost. It argues that firms will minimise the sum of transaction costs and production costs when deciding the extent of integrated and disintegrated model. Within the behaviour assumption of bounded rationality and opportunism, Williamson (1985) showed that the principal dimensions of transactions which consisted of asset specificity, uncertainty and frequency would determine the choice of integration and disintegration. Though providing an elaborate explanation towards the corporate network in the personal computer industry, the logic of transaction cost does not take into account of the co-existence of the competing models within a single industry.

An alternate explanation proposed by Saxenian (1994) was the divergence of corporate networks derived from the social structure of the local business environment where firms originated. She suggested that Silicon Valley computer firms' pursuit of disintegration within their backward linkages were due to their co-operative culture among the engineers and executives who knew each other through informal socialising as students or as participants in local affairs. Hence, external procurement was preferred and suppliers were treated as "partners in a joint process of designing, developing, and manufacturing innovative systems" (ibid p145). On the other hand, the adoption of integration among the East Coast firms reflected the formal interpersonal relationships among executives and engineers. This explanation is quite similar to Whitley's (1990) emphasis on the impact of social institutions upon corporate networks; nevertheless, these perspectives do not accommodate the dynamic nature of a corporate network and do not address changes in the configuration of firms' networks when they undertake foreign investment.

A further explanation in conjunction with the diverged pattern of corporate network is drawn from the concept of firms' administrative heritage (Hannan and Freeman 1977 & 1984; Powell 1987; Ghoshal and Bartlett 1998). When diversifying into personal computer business, some personal computer firms have inherited an established set of business portfolio including component areas such as storage, semiconductor and display. These firms tend to pursue integration in relation to backward linkages, as inherited businesses within the firm are powerful groups for maintaining the status quo. However, this explanation ignores the fact that firms can learn and unlearn strategies over time (Grant 1998); indeed, the evolution of IBM's corporate network has demonstrated the possibilities of learning and unlearning. IBM pursued disintegrated backward linkage when it was committed to enter the market rapidly in 1981 with the introduction of the IBM PC; it then gradually reverted to integration throughout the 1980s. Currently, IBM's personal computer operation co-ordinated

the supply of hard disk drives and some categories of semiconductor with IBM's storage and semiconductor divisions. As the corporate network in the personal computer industry has evolved for two decades, it can be argued that industry participants have had sufficient time to discard the constraint imposed by their administrative inheritance and configure the best practice corporate network.

LINKAGES WITHIN CORPORATE NETWORK

Disintegrated backward linkages within the corporate network of personal computer firms involve the co-ordination between their purchasing teams and independent suppliers. The integrated linkages, on the other hand, suggest the co-ordination among different manufacturing divisions in conjunction with the flow of intermediate products. Table 3 shows the technical specifications of AcerPower 6200 model of desktop system that was launched in the UK in 1999. It can be seen that Acer adopted integration in relation to monitor, motherboard, keyboard, mouse, CD-ROM drive and memory; for instance, it manufactured motherboards in Taiwan, China and the Philippines. Acer also pursued disintegration for remaining items such as microprocessor, hard disk drive and sound card.

Table 3
Component Specifications of Acer's Veriton FP desktop system

	Manufacturer	Model
Microprocessor	Intel	Celeron/433
Motherboard	Acer	V66MA
Chipset	Intel	440ZX
Hard disk drive	Quantum	Fireball EX6.4A 6.4GB
Memory	Acer	128 mb
Monitor	Acer	AcerView 79G
CD-ROM drive	Acer	940E 40x
Sound Card	Creative Lab	ESS1938
Graphics Card	ATI	3D Rage Pro
Keyboard	Acer	PS/2
Mouse	Acer	2 button PS/2

Source: Personal Computer World October 2000 p190.

The geographical extend of the corporate network in relation to the AcerPower system included the Far East and Europe. Acer's Dutch manufacturing site, Acer Computer B.V., received partially completed main system units that required the installation of microprocessors from the Far East. As suggested in the following Table 4, these system units incorporated motherboards, CD-ROM drives, various semiconductor, transformers and capacitors from Acer's various subsidiaries; however, they were also built with externally procured inputs such as metal cases, power supplies, floppy disk drives, sound cards and graphic cards. In addition, Acer Computer B.V. received delivery of keyboards and monitors from Acer's peripheral manufacturing operation in Wales.

Table 4
Acer's Corporate Network: Integrated Forward Linkage

Component	Manufacturing Site
Motherboard	Acer Information Products (Philippines) Inc Acer Information Products (Zhongshan) Inc, China Aopen Inc, Lungtan, Taiwan
Modem	Acer Netxus Inc, Hsinchu, Taiwan Ambit Microsystems Corp, Hsinchu, Taiwan
CD-ROM drive	Aopen Inc, Lungtan, Taiwan Acer Peripherals, Taoyuan, Taiwan Acer Technologies Sdn Bhd, Penang, Malaysia
CD-RW drive	Aopen Inc, Lungtan, Taiwan
DVD drive	Aopen Inc, Lungtan, Taiwan
Display monitor	Acer Peripherals Inc, Taoyuan, Taiwan Acer Peripherals Inc, Wales, the UK Acer Peripherals (Suzhou) Co Ltd, China Acer Technologies Sdn Bhd, Penang, Malaysia Acer Peripherals Mexicana, SA de de CV, Mexico
Keyboard	Acer Peripherals (Suzhou) Co Ltd, China Acer Peripherals (UK) Ltd. Wales, the UK Darfon Electronics, Taoyuan, Taiwan
Capacitors	Darfon Electronics, Taiwan
D-ram	TSMC-Acer Semiconductor Corp, Hsinchu, Taiwan
Logic IC	TSMC-Acer Semiconductor Corp, Hsinchu, Taiwan
CD-ROM Controller IC	Acer Laboratories Inc, Hsinchu, Taiwan
DVD Controller IC	Acer Laboratories Inc, Hsinchu, Taiwan
Flyback transformer	Darfon Electronics, Taiwan

Source: Company Information, July 2000.

The microprocessors were procured from Intel's manufacturing facility in Ireland. Finally, Acer Computer B.V. purchased packaging materials locally.

As for the forward linkage, disintegration is represented by the use of resellers and retailers, hence it requires extensive co-ordination between marketing departments and external sales agents. Retailers constitute the forward linkage structure that flourished since the early 1990s. Retailers can be computer specialists or general trading companies involved in diversified merchandise such as electronic goods, office equipment, toys... The widely acknowledged advantages of retailers are: they handle a high volume of products at low cost; they also undertake warehousing, customer hire-purchase financial arrangements, after-sales services and sometimes technical supports.

Table 5 shows NEC (UK)'s disintegrated forward linkages which comprised twenty-three resellers in the late 1990s³. Resellers, also known as dealers, are specialists that provide added value to the personal computers via the provision of maintenance services and technical support to customers; they played a leading role within the disintegrated model prior to the middle of 1990s. To illustrate, Compaq's 38,000 resellers contributed to 90% of its European and Asia Pacific business in 1994⁴. Resellers can be classified into mail order resellers and corporate resellers. Mail order resellers advertise in specialist magazines whereas corporate resellers are service providers that specialise in the provision of IT outsourcing services. Mail order and corporate resellers vary in size; large corporate resellers such as Computacenter that targeted government and large corporate accounts in the middle of 1990s achieved sales of over £400 millions in 1995, and had 15 offices in the UK with approximately 1,500 employees⁵.

Table 5
NEC's resellers in the UK, 1997

Scotland and the North

Abtex Computer Systems Ltd, Gardner Systems Ltd, Intra Network Systems Ltd

The South

ATM Ltd, Blue Chip Personal Computers Ltd, Bytes Computers Ltd, Compusonic Ltd, Computers by Post, DABs Direct, Desktop Options Ltd, European Electronique Ltd, Gower Microsystems Ltd, Lapland UK Ltd, MAX Imaging Systems Ltd, Ingram Micro, MPC International (UK) Ltd, Noram Components Ltd, P&P Corporate Systems Ltd, Oakbay Technology Ltd, Omega Language Solutions, Redwing International Ltd, Ultima Business Systems Ltd

Source: Computer User Yearbook 1998.

The integrated forward linkage involves the co-ordination between personal computer firms' manufacturing and marketing divisions. The historical integrated model include direct sales teams and retail outlets while the contemporary one include telephone marketing and internet sales. Table 6 summarises the integrated model of forward linkage within Gateway's corporate network, which includes telephone sales, internet sales, retail outlets and person-to-person sales⁶. Company sales teams were prevalent during the mainframe and minicomputer era, where the entrenched profile of a sales person such as one from IBM was that of a well-trained, technically-sound male in a white shirt and a dark suit. However, due to the relatively high selling costs involved in company direct sales teams, they are now confined to the handling of major accounts.

Table 6
Summary of Gateway's integrated forward linkage in the UK, 1999

Telephone Sales	0800-28-2000
Stores	Convent Garden, London; Kingston-upon-Thames, Surrey; Croydon, Surrey.
Sales Teams	Government and Big Business
Internet Sales	www.gateway.com/uk

Source: Company Information 1999.

Telephone marketing has been diffused rapidly since the late 1990s and is currently a much preferred option of forward linkage mode. Telephone marketing was first implemented by Dell in 1984 as its sole forward linkage; Gateway replicated the linkage a year later. By setting up call receiving centres in a European location such as Ireland and Scotland, personal computer firms' multi-lingual marketing teams and technical support teams can handle sales enquiries or orders throughout Europe. In addition, telephone marketing personnel collect first hand customer information that is critical for individual marketing which also establishes valuable customer relationships that in turn create competitive advantages.

The prime examples of company-owned retail outlets are represented by the Apple Centre or Gateway Stores. AppleCentre could be found in London, Croydon, Uxbridge, Cambridge, Maidstone and Barnet in the early 1990s while Gateway Stores are currently located in the Convent Garden, Kingston-upon-Thames as well as Croydon. Internet sales are the latest form of integrated forward linkage. They allow prospective customers interaction with the firms at any time, and are low cost media to maintain and develop customer relationships.

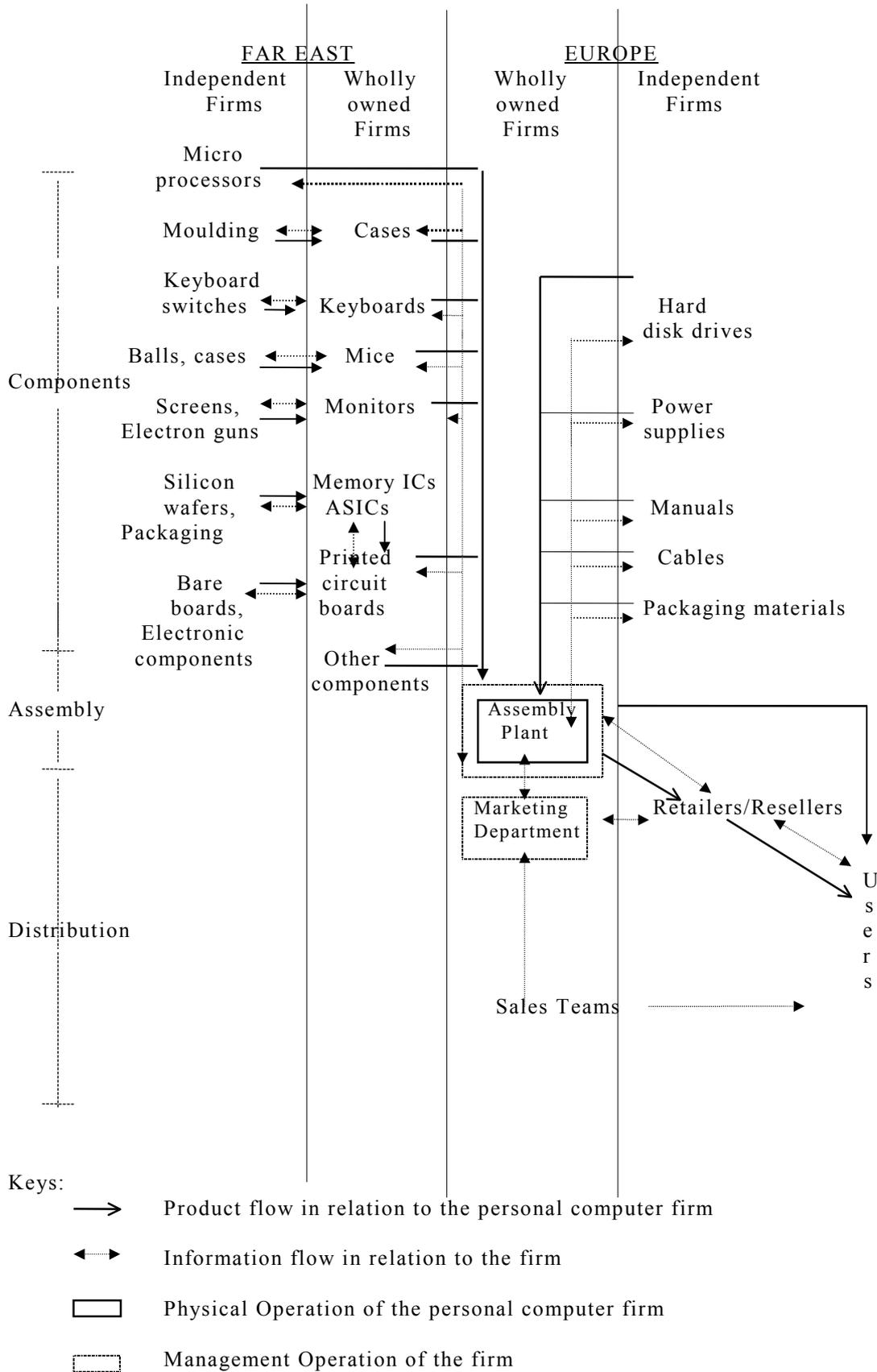
TRADITIONAL AND NEW AMERICAN CORPORATE NETWORKS

The notion of American model has gained recognition in Europe since the implementation of the Marshall Plan. At the industry level, the presence of US multinational firms represented an important channel for diffusing American managerial philosophies and practices; indeed Dunning (1958) found significant American influence on the production system and the marketing function among the British subsidiaries of US multinational firms. The domineering positions of American firms in the European personal computer industry allowed them to set the trajectory of the evolution of the corporate network. Two competing models of corporate network can be identified in the European personal computer industry.

The former is advocated by established US firm IBM, and will be referred as the traditional American corporate network. The latter is propounded by its youthful counterpart Dell Computer and will be referred as the new American corporate network.

The traditional American corporate network has been perpetuated by Digital, Hewlett Packard and Texas Instruments that have previously engaged in mainframe or minicomputer businesses⁷. It considers that corporate network should build on internal capabilities such as technology, human resources and managerial skills and proposes integrated backward linkage where the firm designs the system, manufactures most of the components and then performs the final assembly. It places strong emphasis on the management of the disintegrated forward linkages that comprises resellers and retailers; in particular, it advocates its application in the home and small business market segment. Nevertheless, it has also maintained the integrated linkage of person-to-person sales in the corporate business sector which exploits internal marketing skills and knowledge. Figure 1 illustrates the traditional American corporate network within a Far East participant's notebook computer assembly operation in Europe in 1995. It can be seen that its microprocessors were procured from Intel's Far East sites, 2.5-inch hard disk drives from Seagate⁸ and Quantum's European facilities, while power cords, packaging materials and manuals originated from local suppliers. These components subsequently amounted to 50% of the total value of a notebook computer's component inputs. This firm fulfilled its remaining 50% of the total value of components internally from its headquarters at transfer prices. At the end of 1993, the total value of stocks or work-in-progress at its European site amounted to £16.7 million, which reflected a five weeks stock turnover. This firm also utilised corporate resellers, retailers and person-to-person sales in the European market.

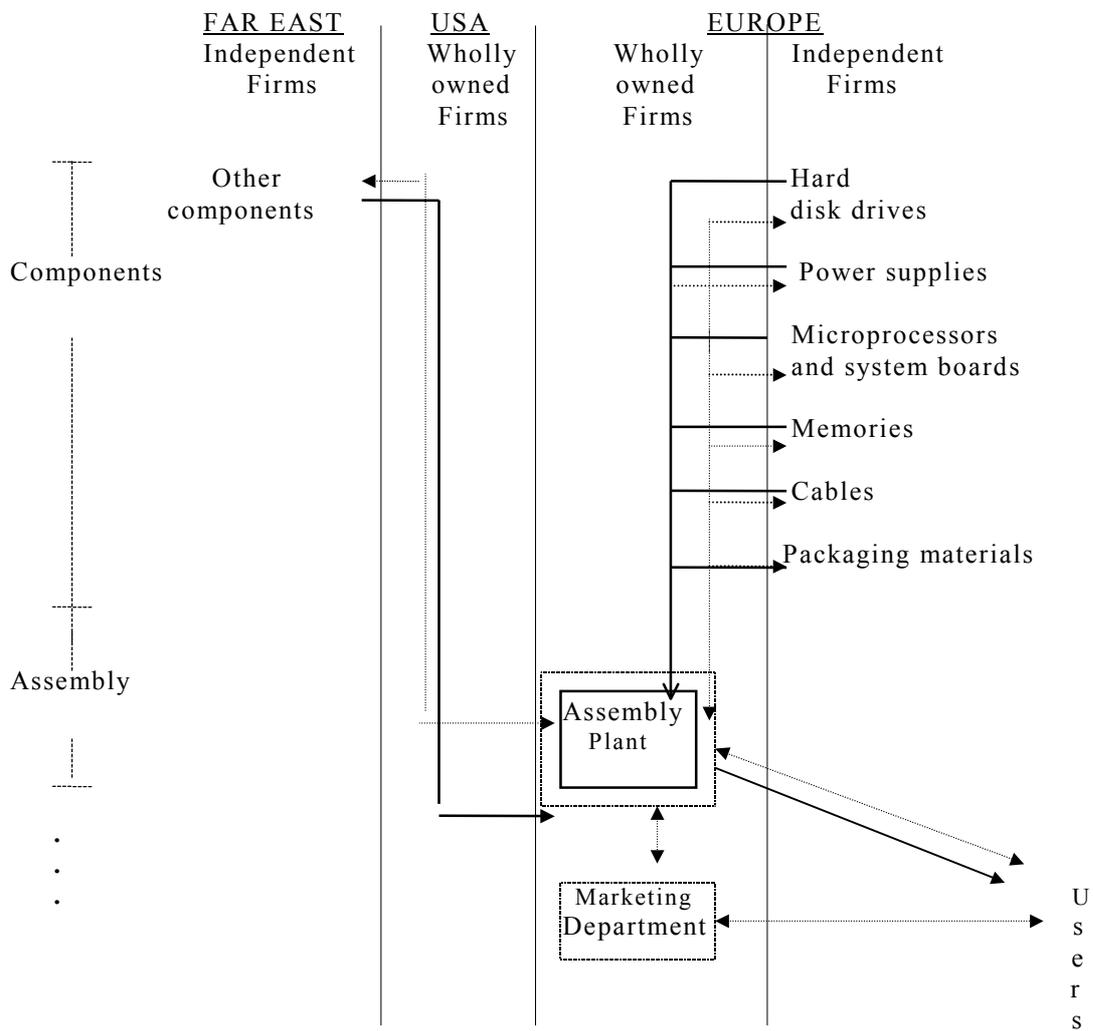
Figure 1
The Traditional American Model of Corporate Network



As a contrast, the new American corporate network which has been advocated by youthful US participants Dell, Gateway and Sun is derived from the marketing concept which strongly advocate an external focus. In Drucker's (1954 p39) word, "the whole business seen from the point of view of its final result, that is, from the customer's point of view". The new American corporate model suggests that competitive advantages can be obtained by positioning among external component suppliers as well as by selling directly via telephone and internet. This enables personal computer firms to concentrate on the core activities of design, marketing and servicing customers. One of the industry participants commented that personal computer firms would not be able to compete with specialist suppliers such as Intel or Seagate, and those that attempted to possess captive capabilities on all core components would be distracted from the logistics of the business⁹. Dell's CEO also explained that "as a small start-up, Dell couldn't afford to create every piece of the value chain. But more to the point, why should we want to? We concluded that we'd better off leveraging the investments others have made and focusing on delivering solutions and systems to customers"¹⁰. The disintegrated backward linkage within the new American corporate network has been extended since the 1990s; for instance, Dell and Gateway employed contract manufacturers such as Quanta and Compal to produce nearly 100% of their notebook personal computers in 1998¹¹.

Figure 2 shows the new American corporate network as adopted by a US personal computer firm in 1996. This participant procured 58% of the total value of its components from Europe, 35% from the Far East and 7% from the US in the first quarter of 1996. Its suppliers at the individual component level included Intel for microprocessors, Samsung, Oki, Hyundai, Toshiba and Motorola for memories, Nokia and Samsung for monitors, Lite-On and High Pro for power supplies... In relation to forward linkage, it utilised telephone marketing in the individual and small business segment, and person-to-person sales with key accounts.

Figure 2
The New American Model of Corporate Network



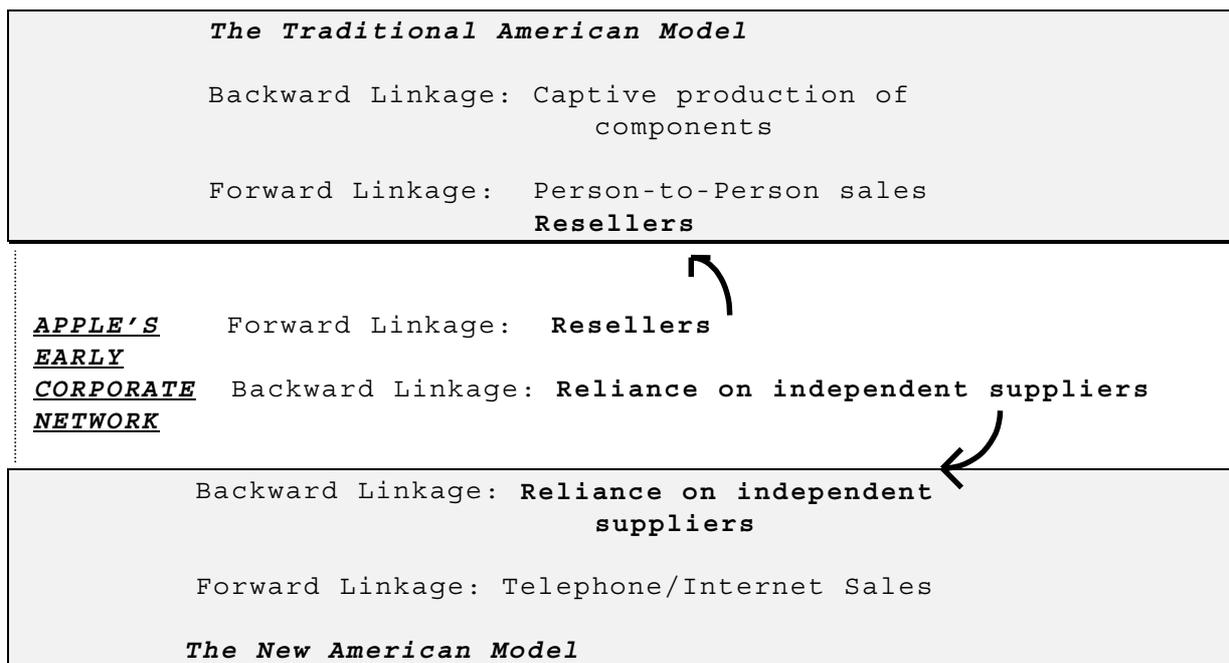
- Keys: Product flow in relation to the personal computer firm
 Information flow in relation to the firm
 Physical Operation of the personal computer firm
 Management Operation of the firm

The two distinguishing models of corporate network in fact shared features of Apple Computer's early corporate network¹². Apple was a pioneer in the personal computer industry which marketed the first PC equipped with colour graphics, keyboard and memory in 1977. In addition, Apple also presented the PC in an attractive case endorsed by its corporate logo, a

rainbow-striped, half-eaten apple. After its tremendous success in the US, Apple marketed in 1977 the Apple II in Europe via its reseller EuraApple; it further set up in 1980 marketing and manufacturing subsidiary in the UK and the Ireland. The Irish facility relied heavily on external procurement as Apple wanted to maintain high degree of flexibility; it explained that: “the old paradigm was that you had as much self-sufficiency as possible... When you do everything yourself, in the short term you may get better margins, but you also lose tremendous flexibility... We want to retain the flexibility of being able to change as circumstances change” (McKenna 1989: p157).

Figure 3 illustrates that both the traditional American model and the new American model have utilised the key features of Apple’s early corporate network. Apple’s disintegrated forward linkage of reseller has supplemented the person to person sales in the traditional American corporate network while the disintegrated backward linkage inspired the backward linkage within the new American network.

Figure 3
The Legacy of Apple’s Corporate Network



CONTINUITY AND CHANGE IN THE EUROPEAN NETWORK

The European personal computer industry has always been dominated by US firms; however, national champions such as Sinclair, Amstrad, ICL, Bull, Siemens Nixdorf, Escom, Philips, Tulip and Olivetti had exerted some influences in their home market during certain periods of the industry's development. Most of these European participants, however, have been acquired or withdrawn from the personal computer business by 1999.

The evolution of corporate network in the European personal computer industry have been driven by trials and errors of US firms. Various writers have discussed the importance of US firms; Servan-Schreiber (1968) observed the superior technology and marketing possessed by them during the 1950s and 1960s, and suggested that their leadership and innovativeness should be the model form of corporation for European firms. The dominant corporate network within the European personal computer industry has been inspired by the traditional American network in the 1980s and by the new American network since the mid-1990s. Nevertheless, the transition from the traditional network to the new network has been a gradual process. Table 7 illustrates the contrasting features of the two models of corporate networks.

Table 7
Contrasting Corporate Networks in the Personal Computer Industry

	Traditional American Corporate Network	New American Corporate Network
Backward Linkage	Integrated linkage in some component areas.	Disintegrated linkage in all component areas.
Forward Linkage	Use of disintegrated linkage in consumer and small business segments but integrated linkage in key accounts.	Use of integrated linkage in all market segments.

The traditional American corporate network was endorsed by IBM, who entered the personal computer market in 1981 with the IBM PC. IBM assigned its Greenock plant in Scotland to undertake the project of manufacturing the IBM PC in 1982. Its corporate network has been characterised by the extensive use of integrated backward linkages in its personal computer assembly operation during the 1980s, which included the sourcing of hard disk drives, monitors, keyboards and power units from internal subsidiaries. IBM utilised independent suppliers on items such as cables, printed circuit boards, metalworks and plastic products. For instance, Fullarton founded in Scotland in 1978 was a winner of IBM Supplier Excellence Awards in the early 1990s¹³; Fullarton specialised in sheet metal fabrication, plastic injection mouldings and cables.

In addition to its corporate sales teams, IBM employed resellers as authorised agents to market its personal computers; one of its UK resellers that engaged in the launch of the IBM PC in 1982 was the MicroComputerland in Surrey¹⁴. The popularity of IBM's systems led to an excess demand in the UK in 1984; as a result, it resorted to the use of a quota system that allocated twenty-five machines to each reseller. This scheme encountered criticisms from large resellers with broad customer bases. Consequently, IBM revised the quota system and linked the quota to forecasted volume of sales¹⁵.

Leading Far East personal computer firms that entered the European market during the 1980s adhered to the traditional American corporate network despite their different linkages at home; most notably, they utilised the disintegrated forward linkages comprising resellers and distributors extensively. For example, Taiwan's Acer which set up marketing subsidiaries in Germany, the UK and France between 1985 and 1989 adopted the disintegrated forward linkages, as opposed to its approach at home of setting up Acerland retail stores. Japanese firms such as NEC who preferred tight control of the distribution channels and owned large number of resellers in Japan also followed the traditional American model. When

participating in the UK market, NEC utilised a reseller, IBR Microcomputers in Reading, Berkshire to handle the sales of its PC-8000 in England and Wales in 1982. Similarly, Toshiba utilised Scan Computers Limited in Storrington, Sussex as its sole distributor in the UK. Scan Computers performed the wholesale function and handled low-value reseller orders.

In the areas of backward linkages, the traditional American model of integration has also been widely imitated by Far East personal computer firms. To illustrate, Toshiba's manufacturing investment in Germany, which was established in 1990, practised integrated linkages in relation to inputs such as hard disk drives, printed circuit boards, memories and batteries despite the growing trend of disintegration in the Japanese computer industry led by Fujitsu since the early 1970s. Ohmae (1982) explained Fujitsu's shift to the use of more external suppliers as a strategic response to the growing fringe-benefit cost as well as rapidly increasing labour cost.

The new American model that emerged in Europe since 1987 was introduced by Dell's UK marketing subsidiary. At the time, it was commented that "in early June this year, PCs Ltd set up in business in the UK. The company calls itself the Dell Computer Corporation... As in the US, you can't walk into a dealer in the UK and buy a Dell machine—you have to order it over the phone and it will be delivered by courier to your door"¹⁶. Dell recalled the negativism of its new model by twenty-two British journalists attending its first European press conference in June; twenty-one of them predicted that Dell would fail (Dell & Fredman 2000 p28). Dell further refined the integrated forward linkage by extending in 1996 its sales via its website in the US; it obtained US\$1 million sales from the site in the middle of March 1997. . Dell commenced internet sales in some European markets in 1998. Its global internet sales reached 30 million a day by July 1999, representing 40% of its sales revenues¹⁸.

Dell's CEO mentioned this forward linkage as “zero-variable-cost transactions”¹⁷

The new American corporate network can also be seen in Dell's backward linkage. Dell established an assembly plant in Limerick, Ireland in 1991, where it implemented disintegrated backward linkages in relation to all intermediate products. This investment further attracted personal computer suppliers' agglomeration in the UK and Ireland. For example, Samsung located its monitor manufacturing plant in the North of England while China Picture Tubes invested in speciality glass facility in Scotland in the middle of 1990s. Gateway entered the European market with both marketing and manufacturing investment in Ireland in 1993 also utilised the new American corporate network. A common characteristic of Dell and Gateway is that both firms were founded by entrepreneurial founders during the middle of 1980s; the former by Michael Dell and the latter by Ted Waitt. The two entrepreneurs, both in their mid-thirties, were leading candidates of Fortune's “Young and Rich” Americans in 1999 whom the magazine described as “amassing fortunes faster than any generation in history”.

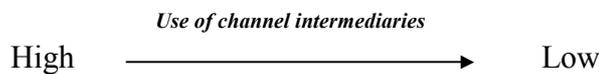
The success of Dell and Gateway has generated changes among Japanese and US counterparts since 1990. Both US and Japanese participants contracted the extent of integration within the backward linkages as well as expanded into integrated forward linkages with telephone sales and internet sales. Most notably, IBM and Compaq that depended heavily on the co-operative relationship with resellers in the late 1990s also realised the importance to incorporate telephone sales teams and internet sales in forward linkages. As for backward linkages, disintegration have become acceptable among industry participants. HP, IBM, NEC and Fujitsu have increasingly utilised the new model. For instance, IBM entered into alliance with Taiwan's Acer for the supply of monitors whilst HP signed a 3-year manufacturing contract with Korea's Trigem for the supply of desktop personal computers in 1999. NEC and Fujitsu have increasingly turned to external procurement; for example, they

have focused on the production of high end liquid crystal display monitors in recent years and purchased the low end small size cathode ray tube monitors from Taiwanese suppliers. They have further extended their sourcing of components to purchasing of manufacturing services for semi-finished personal computers. NEC's Taiwan procurement of desktop personal computers increased from 10% in the 1998 financial year to about 50% in the 1999 financial year. Similarly, it sourced about 50% of its notebook computers from contract manufacturers in 1999. It has also been reported that Toshiba, who always insisted on the integrated backward linkage had established links with Korean suppliers for the supply of monitors¹⁹. Figure 4 graphically depicts their migration from the traditional US model.

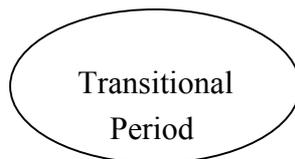
Figure 4
Corporate Network in the European personal computer industry:
From the traditional American model to the New American model

Industry Norm of Consumer PC

FORWARD LINKAGE



1980s



1990s

External procurement as a % of total procurement



BACKWARD LINKAGE

NATIONAL CULTURE & EVOLUTION OF CORPORATE NETWORK

In this section, I will provide a cultural explanation of the evolution in the corporate network among the leading personal computer firms in Europe. The earliest study of the impact of national culture on organisation is associated with Crozier's writing on bureaucracy (1964); he explained that "the French bureaucratic system of organization is the perfect solution to the basic dilemma of Frenchmen about authority" (ibid p222). He stated the French's dislike of informal, face-to-face relationships and the preference for centralisation were "reconciled within a bureaucratic system, since impersonal rules and centralisation make it possible to reconcile an absolutist conception of authority and the elimination of most direct dependence relationships" (ibid).

The concept national culture first appeared in the English language in the late nineteenth century when anthropologist Tylor (1871 p1) defined it as "that complex whole which includes knowledge, beliefs, arts, morals, custom, law and any capabilities and habits acquired by man as a member of society". Since then, various social scientists have provided their conceptualisations of national culture. A highly accessible and widely accepted definition is provided by Hofstede (1980 p21) who defined national culture as "the collective programming of the mind which distinguishes the members of one group of category of people from another"; Hofstede further pointed out that the deepest manifestation of national culture is its value; he identified four major work-related values that differ across cultures, ie individualism, power distance, uncertainty avoidance and masculinity.

The impact of national cultural value is widespread and permeates a nation, its industry, its firms and its people. Hambrick and Mason's (1984) upper-echelons theory stated the importance of personal values and cognitive bases of top managers in the formulation of corporate decisions, which in turn suggested that the diversity of corporate network could be understood by differences in national cultural values where firms originated. As the top

management are typically composed of nationals from the headquarters, the impact of national cultural value cannot be ignored²⁰. Indeed, Adler (1997 p15) stated that “individuals express culture and its normative qualities through the values that they hold about life and the world around them. These values in turn affect their attitudes about the form of behaviour considered more appropriate and effective in any given situation”. Udy (1959) also wrote: “each individual member of any organization has been socialised relative to a larger society, and thus brings with himself into the organization from the outside various expectations and values which inevitably enter into the way he plays his role and interacts with others”.

The focus of national cultural value in this paper is individualism, which is most relevant to the discussion of corporate network. Trompennars (1993) pointed out individualism would affect the way organisations structured themselves, in a sense that, in individualistic cultures organisations were constructed to serve individual owners, employees and customers. Their ties were therefore abstract and legal ones that were regulated by contract; each member performed a differentiated and specialised function. As a contrast, the organisation was often linked to a family, community or clan and represented a social context that all members shared in collective cultures. This suggests that the demarcation of job would be less well-defined.

The impact of individualism on corporate network is associated with the degree of conformity; it has been suggested that individual firms imitate other firms for social or economic reasons (Pfeffer & Salancik 1978; DiMaggio & Powell 1983; Tolbert & Zucker 1983...) ²¹. Nevertheless, the replication of the traditional American corporate network differs among Far East and youthful US firms. Specifically, Far East participants originating from collective societies will adhere to the traditional corporate network; on the contrary, youthful US firms that are embodied with individualism will challenge existing practices and pioneer the new American corporate network.

Individualism denotes that each human being is unique, equal and independent; it is manifested in loose human relationship and is fostered by advocating individual freedom. An individualistic culture encourages its members to be self-reliant, unique and competitive in order to achieve their goals. Individualism supports the neo-classical economic theory that the aggregate of individuals' self-interests and independent decisions will contribute towards the most efficient allocation of resources, and is an entrenched value in the American culture. For instance, the Declaration of Independence and the US Constitution explicitly defined that the individual is a separate entity. Conversely, Japan and Taiwan are collective cultures with low levels of individualism; the relationships between individuals are tighter and the social norms are to consider the interests of other people before advancing one's goal. The Confucian legacy in Japan and Taiwan means that individuals tend to establish one's identity relative to the family, the work place and the state, and place strong emphasis on obligations to socio-economic networks.

The level of individualism in societies where personal computer firms originated will exert influence on their conformity towards the American model of corporate networks within Europe. The psychology of conformity has been evidenced in Asch's (1951) classic study which demonstrated individual conformity to group judgements that were in conflict with the individuals' own. Later studies also found that people were likely to conform to the behaviour of those with specific task competence (Mausner 1954; Rosenberg 1963; Huang & Harris 1973..); moreover, research in organisation such as the Hawthorne Studies²² reiterated the fact that individuals conformed to a prevailing group norm in output. The typical degree of individual conformity to the group norm varies across culture. In collective cultures, there are strong emphasis on co-operation, hence individuals that are faced with group pressure tend to follow the consensus. On the contrary, in individualist cultures, the emphasis on independence generate variations within groups and approve non-conformist. Researchers

found variations across cultures to the acceptable degree of conformity; they have shown that members of a collective culture are more likely to follow the group norm than those from an individualistic culture eg Claeys (1967), Chandra (1973), Boldt (1978), Huang and Harris (1973)...

DISCUSSION

In the context of the evolution of corporate network within the European personal computer industry, the early entrant Apple Computer from an individualistic culture had indeed departed from the entrenched model of corporate network in the computer industry and relied heavily on resellers and independent suppliers. It should also be noted that Apple perceived personal computers as consumer products as opposed to the preceding conception of industrial products for scientific institutions or the big businesses. Furthermore, it has been seen that the individualistic youthful US firm Dell did not conform to the traditional American corporate network; it improvised Apple's early corporate network and became the pioneer of the new American corporate network. Most importantly, it can be recalled that Dell's integrated forward linkage of telephone marketing was unique in the 1980s and worked against the industry best practise. Michael Dell has commented on Dell's forward linkages in the UK as "thinking unconventionally" and "we're willing to take the risk" and wrote: "if you've got an idea that's really powerful, you've just got to ignore the people who tell you it won't work..." (Dell & Fredman 2000 pp28-9).

In addition, Japanese and Taiwanese firms from collective societies that are more susceptible to the influence of existing industry norm have replicated the traditional American model endorsed by historic blue chip firm IBM. IBM's superior position in the industry can be witnessed in its market shares. It led the total value of European shipments in computer during the 1980s; its total shipments, for example, amounted to nearly US\$12,000 millions in 1983 and were higher than the accumulated shipments from its followers Bull, Siemens,

DEC, Olivetti, ICL, Burroughs, Nixdorf, Hewlett-Packard and NCR²³. In the personal computer segment, IBM had leading market shares of 17.6% in Europe in 1990²⁴. There was even a saying among corporate buyers during the 1980s that “nobody ever got fired for buying IBM”; which illustrated the general confidence in IBM²⁵. Kelly and Keeble (1990 p20) wrote that “IBM dominates the information technology (IT) industry in a way which few companies in other markets can claim to match. It is a market leader, a trend-setter, a model employer, and an innovator, but above all, a superb marketer”. Japanese and Taiwanese firms have looked upon IBM as a reference of best practice. For instance, Acer’s CEO stated that “in 1989 I thought IBM was the best-managed company in our field. I supposed that Liu (a 20-year-old IBM veteran) was more experienced and capable than I”²⁶. Besides, two Hitachi employees even committed a criminal offence in an scandalous attempt to obtain IBM's mainframe S3081 technology in California in 1982²⁷.

Finally, the historic US firms and the Japanese firms’ transition towards the new American model further reiterated the importance of national culture. Though both of them have re-oriented themselves towards the new American model during the 1990s; Japanese firms conformed to a greater extent to the new model of corporate network than their US counterparts from an individualistic culture. For instance, HP incorporated the disintegrated backward linkage into its reseller network and allowed resellers to perform final assembly²⁸.

CONCLUSION

This paper has depicted the corporate networks of leading personal computer firms in Europe and provided a cultural explanation on their evolution. It is suggested that their evolution during 1977-99 have been driven by national culture. In particular, the cultural value of individualism which affects conformity has led to the replication of the traditional American model of corporate network among Far East personal computer firms during the

1980s as well as the pioneering of the new American model among youthful US firms since 1990. In addition, the transitions from the traditional American model to the new American model reiterated the impact of individualism; the individualistic US firms with previous experience in the computer industry undertook innovation within the new American corporate network whereas Japanese firms simply imitated the existing system. Furthermore, the fact that industry participants overlooked the corporate network of the youthful US firm Apple and conformed to the traditional American corporate network associated with the reputable computer firm IBM is consistent with the literature on inter-firm imitation. Finally, the shift of the industry best practice corporate network from the emphasis on legitimacy to efficiency also shed light on the changes on the basis of inter-firm imitation over times and suggests that in the long run economic rationalism will prevail.

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NOTES

1. Final products refer to the goods consumed by end-users whereas intermediate products refer to the factor inputs used in producing final products.
2. The Financial Times, 24 September 1999, p20.
3. The Computer User YearBook 1998, London: VNU Publication.
4. Quoted from Business Week 2 November 1992 p67 and Management Today December 1994 p69. It should be noted that Compaq's success was also due to the high street resellers of the time. High street resellers are small, independent specialists that retail personal computers and related products in village, town or city locations.
5. The Computer User YearBook 1996 p45, London: VNU Publication.
6. Gateway, however, embarked a reseller programme in 1998.
7. Digital was acquired by Compaq in 1997.
8. Seagate closed its Irish plant in 1997 amidst falling prices in hard disk drives.
9. A comment made by an industry participant in 1996 during a personal interview by the author.
10. See The Power of Virtual Integration: An interview with Dell Computers' Michael Dell, Harvard Business Review, March-April 1998, p74.
11. Estimated by Nomura, Taipei 1999.
12. Apple shifted from the disintegrated model and increasingly pursued the integrated model in relation to its backward linkages during the early 1980s, for instance, it set up keyboard manufacturing in Garden Grove, California and a peripheral plant in Millstreet, Ireland. Nevertheless, it reverted back to the disintegrated model after 1991.
13. Key British Enterprises, Dun and Bradstreet 1995.
14. The IBM PC was retailed at the time at the starting price of £2,800 by MicroComputerLand in Richmond, Surrey (Management Today July 1982 p26).
15. The Times 8 March 1984 p22.
16. Personal Computer World July 1987 p113.
17. Fortune 14 April 1997 p15
18. The Financial Times 18 August 1999 p16
19. The Financial Times 25 November 1999 p33; The Korean Economic Weekly 16 & 17 August 1999.
20. The top management of US, Japanese and Taiwanese personal computer firms are dominated by their headquarters nationals. Moreover, members of the board of directors in Japanese firms tend to be senior employees that have considerable experience in the firm; Though Taiwanese firms also valued loyalty, they appoint talented young managers in senior management. US firms emphasise on individual capabilities, rather than age or experiences with the firm when appointing senior management.
21. Social reasons for inter-firm imitation include the desire to adopt the practice that is considered to be legitimate.
22. The Hawthorne Studies refer to a group of studies conducted at the Hawthorne plant of the Western Electric Company during the 1920s and the early 1930s. For example, the first study examined the relationship between lighting and productivity.
23. Data Management June 1985 ix.
24. The Financial Times 23 April 1991, The Computer Industry Survey.
25. The Times 24 July 1992 p28.
26. Fortune 30 October 1995 p72.
27. Fortune 7 March 1983 p50.
28. Business Europe 23 April 1997.