

**Management 2020:
The Information Technology Imperative**

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Abstract

The impact of information technology on management theory and practice has been recognized since at least the late 1950s. This article explores the past, present and future of information technology and its impact on management thinking. The article begins with a review and discussion of past predictions about the future of information technology. Next, the role of information technology and its impact on the modern organization and present managerial thinking is discussed. The article concludes with four key predictions regarding information technology and its impact on management in the year 2020: convergence, decentralization, virtuality and commodification.

Management 2020: The Information Technology Imperative

There is perhaps no single factor that has had the impact on the management of our modern organizations like information technology. Its impact is immediate, apparent and permeates the entire organization. From the corporate database to the departmental server to the word processing software running a secretary's PC, information technology is intertwined into our corporate environment. Entire companies are built or are being restructured around it. Further, it is also beginning to reshape the society in which we live.

Not surprisingly, management theorists were quick to realize the impact of these new technologies. What may be surprising is how far ahead management scholars were able to anticipate future events. In 1958, Leavitt & Whisler released a Harvard Business Review article, "Management in the 1980's," in which they argued that information technology would have a broad and pervasive impact. The article laid out a vision for the future, as seen through the eyes of management theorists from the late 50's.

It is perhaps important to occasionally revisit the thinking of management scholars past and attempt to plot their connection to management thought today. While much has been written about visions for the 21st century (e.g., Hitt, Keats DeMarie, 1998; Ireland & Hitt, 1999), little has been spent upon reflections of the past. Where did we get it right? Where did we get it wrong? It seems appropriate at the juncture of two centuries to take a few precious moments to reflect not only the direction we are going, but also more importantly to reflect upon where we have been.

This article explores the past, present and future of information technology in the management literature and makes several predictions regarding its impact on management theory

and practice. The article begins with a review and discussion of past predictions about the future of information technology. Next, information technology and its impact on present managerial thinking is discussed. The article concludes with four key predictions regarding information technology and its impact on management theory and practice in the year 2020: convergence, decentralization, virtuality and commodification.

Management 1960

Leavitt & Whisler (1958), in their Harvard Business Review article "Management in the 1980's," argued that a new technology had begun to emerge, which they called *information technology*. The technology, they stated, was composed of three related parts. First, the arrival of the high-speed computer. Second, statistical methods for decision-making problems. Last, the simulation of higher-order thinking through computer programs (Leavitt & Whisler, 1958, p.41). Leavitt & Whisler broadly argued that the new technology would "...move into the managerial scene rapidly, with definite and far-reaching impact on managerial organization." (p.41). Further, they stated that the technology was likely to have its greatest impact on middle and top management.

Acceptance of information technology (IT) by business in the early 1960's, however, was limited. Indeed, in 1958: "Its applications appear to be independent of central organizational issues like communication and creativity" (Leavitt & Whisler, 1958, p.42). They argued that the lack of acceptance stemmed largely from the (then) current trend toward participative management, or the human relations movement (Robbins, 1990).

Their central argument was that participative management and information technology would have incompatible effects. IT, in their opinion, represented the opportunity for top

management to return to earlier forms of managerial control. Even with the return to centralization, however, change in the organization was inevitable:

Many business decisions once made judgmentally now can be made better by following some simple routines devised by a staff man whose company experience is slight, whose position on the organization chart is unclear, and whose skill (if any) in human relations was picked up on the playground...Such decisions may soon be made centrally by individuals whose technical skills are in mathematics and computer programming...

(Leavitt & Whisler, 1958, p.43).

Information technology, they predicted, would move much of management back to a centralized, scientific management approach. Taylorism (Robbins, 1990), in other words, would be the result of the widespread introduction of information technology. IT would routinize many middle management functions, thereby making recentralization possible (Leavitt & Whisler, 1958).

The 1958 article ranged far and wide regarding predictions for the future of management. Rather than deal with each point raised by Leavitt & Whisler, let us look at two broad classes of their ideas. The first is organizational. Broadly stated, they made make five predictions for the future of management:

- (1) Information technology is likely to have its greatest impact on middle and top management.
- (2) A radical reorganization of middle-management levels should occur.
- (3) IT will allow large organizations to recentralize.
- (4) The programmer will find a place close to the top.
- (5) Top management will become more abstract and correspondingly less directly involved in the nature of making routine decisions.

Likewise, Leavitt and Whisler also made several very interesting predictions regarding the broader societal impact of information technology:

- (6) Information technology will spread rapidly
- (7) Radical rethinking of organizational ideas is to be expected.
- (8) Information Technology will challenge many long-established practices and doctrines.
- (9) The rate of obsolescence and continuous change should spread rapidly.
- (10) Within ten years a digital computer will be the world's chess champion.

An open question that Leavitt and Whisler also ask in their work is as follows: What will happen to American class structure? Do we end up with a new kind of managerial elite? Will technical knowledge be the major criterion for membership?

The end of the 1960's also included a small event that went largely unnoticed at the time: two bulky computers were hooked together by a 15 foot gray cable. These two computers began to send test data back and forth between themselves. This connection, the first link in the Internet, was born in Los Angeles in 1969 with little attention and no fanfare (Fordahl, 1999). The impetus for the Internet came from ARPA, the Advanced Research Projects Agency (Cerf, 1999). ARPA research was directed toward enabling geographically remote computers to communicate and share information. Much of the urgency for this research came from the Soviet launch of Sputnik (Fordahl, 1999). This original packet switching technology was the genesis of today's Internet technology (Cerf, 1999).

Management 1980

How well did the Leavitt and Whisler predictions hold up in the 1980's? Let's examine each of them in turn. Considering their first assertion, that information technology is likely to

have its greatest impact on middle and top management, is highly debatable. If anything, the opposite has in fact been the case. IT has led to a transformation throughout the value chain of the organization (The Net Imperative, 1999). One case in point is the customer service representative. As IT became increasingly sophisticated, more and more information began to be pushed further and further down the organization, until front line workers began interfacing directly with corporate databases.

Their second organizational prediction, that a radical reorganization of middle-management levels should occur, was remarkably prescient. Consider:

There will be many fewer middle managers, and most of those who remain are likely to be routine technicians rather than thinkers... One major effect of IT is likely to be the intensive programming of many jobs now held by middle managers and the concomitant “deprogramming” of others.

(Leavitt and Whisler, 1958, p.39).

Remarkably, Leavitt and Whisler anticipate the management restructuring, downsizing and “merger mania” of the mid-1980’s. The “flattening” of organizational hierarchies has been commented on by later theorists (Robbins, 1990).

It is perhaps surprising, then, that while Leavitt and Whisler anticipate the flattening of the organization that they do not go one step further and predict that the decentralization of organizations would continue. Rather, they predicted that IT would allow large organizations to recentralize their organizational control. As a result, they were concerned about the depersonalization of relationships within management and greater distance between people at all levels of the organization (Leavitt & Whisler, 1958, p.39). It is arguable, however, that the opposite (decentralization) has occurred. Decentralization has been driven by the spread of information technology throughout the organization:

...The reason is that management information systems can substitute computer control for rules and decision discretion. Computer technology rapidly appraises top management of the consequences of any decision and allows them to take correct action... Information systems should lead to the appearance of more decentralization with no commensurate loss of control by top management

(Robbins, 1990, p.107).

If taken within the context of the late 1950s, it should perhaps not be surprising that Leavitt and Whisler predict a return to Scientific Management in the organization, for *these were the management principles of their time*. Their work is reflective of the Scientific Management paradigm, while the Human Relations School was only beginning to make inroads into accepted thought. Open systems theory and contingency approaches to management theory emerge and achieve preeminence only later, in the 1970's and 1980's (Robbins, 1990).

Next, Leavitt and Whisler predict that the programmer will find a place close to the top. The Information Technology manager has indeed emerged. This phenomenon is also echoed in our universities, where CIS and MIS acronyms co-exist in our business schools next to the more traditional departments of finance, accounting, marketing and management.

Finally, the idea that top management will become more abstract and correspondingly less directly involved in the nature of making routine decisions, invokes a large literature on top management decision-making and strategic management (e.g., Mintzberg, etc.). Without question, IT has created information overload for the top management professional.

How do the broader Leavitt and Whisler predictions hold up? How quickly did information technology spread? It is arguable that IT did not begin rapid growth beyond the largest of modern organizations until the early 1980's, with the introduction of the personal

computer (PC). The IBM PC, in particular, set the stage for an explosion of information technology.

Has a radical rethinking of organizational ideas occurred? Has IT challenged many long-established practices and doctrines? Economists are still arguing whether or not a radical change in our economy has in fact occurred as a result of Information Technology (How real is the new economy?, 1999). The argument goes that the statistics regarding labor productivity growth in the US do not provide evidence that IT has created a "new economy." In other words, if IT has in fact revolutionized the organization, then these results should be reflected in a large growth in labor productivity. This has not, in fact, occurred (Work in Progress, 1999).

Other economists argue that the method of measurement of labor productivity is flawed, and does not accurately reflect this new economy (How real is the new economy?, 1999). Still others argue that the rapid introduction of IT in the 1980's does not necessarily mandate an immediate productivity payoff; productivity gains may only be captured long after the widespread acceptance of a new technology. They refer to the example of the introduction of electricity at the turn of the century as an example of a technology that did not massively shift the US economy until decades after introduction (Work in Progress, 1999). The debate is ongoing.

On a related note, has IT impacted organizational theory? Certainly, it is arguable that contingency and open systems theorists were heavily influenced by IT. Beginning with March & Simon (1958), the role of technology and the cognitive limits of humans began to be incorporated in organizational theory. The role of technology also began to be explicitly modeled beginning with Woodward (1965).

It is interesting that Leavitt and Whisler should be talking about an increasing rate of obsolescence and the spread of continuous change in the late 1950's. Their comments appear almost modern, and indeed foreshadow the concept of Hypercompetition (D'Aveni, 1994). The increasing rate of change, however, is indisputable. Moore's Law has held firm through recent decades, and IT has followed (led?) at a commensurate pace.

Finally, Leavitt and Whisler predict a digital computer would be the world's chess champion in ten years. If we take 1958 as the year of their prediction, it implies that 1968 would have been the predicted year of the digital computer champion. In fact, it took 39 years and three separate matches for a computer to beat the world champion (Kasparov v. Deep Blue, 1997). Deep Blue, a 32-node IBM RS/6000 computer, is a scalable, highly parallel system capable of calculating 100 to 200 billion chess moves within three minutes (ibid., 1997). The entire match with Gary Kasparov, including commentary, was broadcast over the World Wide Web.

Management 2000

Information technology, at the millennium, has brought management to what can best be described as a "strategic inflection point" (Puffer, 1999).

Let us start with strategic inflection points. They represent what happens to a business when a major change takes place in its competitive environment. This can be a major change due to introduction of new technologies...Almost always it hits the corporation in such a way that those of us in senior management are among the last ones to notice...A strategic inflection point causes you to make a fundamental change in business strategy. Nothing less is sufficient.

(Andy Grove, quoted by Puffer, 1999).

With the advent of commercial applications of the Internet in the early 1990's, electronic commerce has quickly and inexorably changed the nature of the business environment.

Consumer sales over the Internet have gone from \$3 billion in 1997 to \$11.9 billion by the end of 1999 with projections to reach \$41 billion by 2002 (E-Commerce, 1999).

One model corporation of this new channel of commerce is Dell Computer. Dell computer's website (<http://www.dell.com>) represents the bypass of traditional distribution channels in favor of a direct, made to order approach. At the end of 1998, the Dell website processed orders at a rate of about \$3 million a day, or 5% of revenues (Wysocki, 1999a). In the third quarter of 1999, the Dell website was processing orders at a rate of \$30 million per day, or about 40% of revenues (McWilliams, 1999). This phenomena, spreading quickly throughout industry, has given rise to the expression "Dell or be Delled" (Wysocki, 1999b).

All of this consumer electronic commerce, however, is a drop in the bucket compared to the potential for business-to-business transactions. Intercompany transactions over the Internet were \$18.5 billion in 1997, will hit \$109 billion by the end of 1999, and are projected to reach \$1.3 trillion by 2002, an annual growth rate of 99% (E-Commerce, 1999).

The driver of the shift to electronic commerce is not fad driven. Rather, the movement to the Internet is being driven by that most basic of business necessities, cost:

The Internet is helping companies to lower costs dramatically across their supply and demand chains, take their customer service into a different league, enter new markets, create additional revenue streams and redefine their business relationships. What Mr. Grove was really saying was that if in five years' time a company was not using the Internet to do some or all of these things, competitors who are would destroy it.

(The Net Imperative, 1999)

This is precisely the difficult lesson that companies like Merrill Lynch have started to learn. Faced with significant inroads into their core markets being made by web-based, discount brokers (e.g., Charles Schwab, etc.), Merrill Lynch has finally made the difficult decision to

enter the electronic arena. The struggle at Merrill was intense, not least because it represented a dramatic shift from their broker-based sales culture. High-level resignations followed the painful decision to begin offering electronic brokerage (Gasparino, 1999).

Management theory, and particularly theories of the firm, has moved from early open systems theorists (Thompson, 1967), to more power and politics based theories (March & Simon, 1958; Pfeffer, 1981) to theories derived from industrial organization (IO) economics (Porter, 1980). Later, the organizational economics (OE) paradigm became dominant in strategic management; it includes transactions costs economics (Williamson, 1975) and agency theory (Fama, 1980; Jensen & Meckling, 1976). The idea of the firm as a “nexus of contracts” (Jensen & Meckling, 1976) has profoundly shaped management thinking in the late 20th century.

As of the year 2000, the Resource-Based View of the firm (Wernerfelt, 1984) has emerged as an important new theoretical model (Hoskisson, et. al., 1999). The RBV conceptualizes the firm as a bundle of resources, many of which are idiosyncratic to the firm itself (Barney, 1991). “The notion that firms attain a unique character by virtue of their heterogeneous resources is the basis of RBV” (Hoskisson, et. al., 1999, p.438).

One intriguing offshoot of the RBV model is the Knowledge-Based (KBV) theory of the firm (Tsoukas, 1996; Spender, 1996; Liebeskind, 1996; Grant, 1996). The knowledge based view regards firms as “integrating the specialist knowledge resident in individuals into goods and services” (Grant, 1996, p.120). Knowledge, then, becomes the primary resource of the firm, rather than the neo-classical view of the firm as labor and capital. Attempts have also been made to integrate the RBV and KBV theoretically, through the idea of the capability for continuous learning (Lei, et. al., 1996).

The idea that knowledge and information are the lifeblood of the firm is not new (e.g., Polyani, 1966). What is new is that knowledge-based industry now makes up over half of total GDP in the world's largest economies (A survey..., 1996a). Many of the most successful companies in the year 2000 are Internet companies, who produce virtually no physical product, and whose services are either in the form of information, conduits to information, or acting in the role of an intermediary (or "infomediary") (The heyday of the auction, 1999).

One such "infomediary" is EBay (<http://www.ebay.com>). EBay acts as a clearinghouse, boasting over 2 million auctions at any one time (The Heyday of the Auction, 1999). As such, it acts as a highly efficient market mechanism, serving to reduce inefficiencies in market pricing for virtually any product or service imaginable (ibid., p.68).

The difficulty that is posed by such an efficient market mechanism is just that: it is a transparent, highly efficient market mechanism. EBay, and others like them, stands to change the way business is conducted, and this will fly in the face of convention and accepted business practice in ways that cannot be anticipated. In September of 1999, a man offered to sell his kidney over the EBay website. Bidding reached \$5.7 million before the auction was stopped (Delgado, 1999). But for how long?

Management 2020

It has become apparent that information technology is rapidly transforming the landscape of global business. The imperative of competitiveness has increased the pace by which these changes must be made; its impact on organizational structure and communications has been rapid and discontinuous. Communications has been one facet of this change that few anticipated.

It turns out that bringing people together is the ultimate killer application (The Heyday of the Auction, 1999).

Stated succinctly, and extrapolating from trends in information technology that are emerging with the arrival of the 21st century, it is likely that the following organizational outcomes will occur in 2020:

- (1) Convergence
- (2) Decentralization
- (3) Virtuality, and
- (4) Commodification

Convergence

One byproduct of the appearance of the World Wide Web has been a dramatic rethinking of the nature of communications technology. It is convenient to think of the telephone, the television, the radio and the World Wide Web as separate means of communication. Some of these sources are interactive (such as the telephone) and others are not currently interactive (such as the television). By 2020, these distinctions will be irrelevant.

We see this being played out clearly in the telecommunications industry today (So the Elephants Danced, 1998). While themselves not certain of the outcome, telecommunications giants such as AT&T and MCI WorldCom have been rapidly acquiring companies outside their traditional telecommunications fields, such as cable, internet service providers, and media companies. The net effect of these mergers and acquisitions is the rapid consolidation of these telecommunications corporations into a communications infrastructure – voice, images, and data. In 2020, data will be the predominant exchange on these networks.

The impact of the information technology convergence on organizations is already being felt. Corporations are beginning to rebuild themselves around this new IT infrastructure. In 2020, the entire corporate value chain will be built around this network, including the supplier, corporations and buyer in a real-time environment. Corporations unable to adapt to this new paradigm will find themselves increasingly outmoded.

Decentralization

One of the most profound organizational byproducts of the IT revolution will be the increased decentralization of the organization. Whereas information and decision making control had traditionally resided with the upper levels of management, the impact of IT will be to decentralize both information and control.

These phenomena will be a continuation of the trends seen in the late 1990's. With the integration of suppliers, firm and buyers, it will be imperative that decision-making authority be relegated to the levels closest to the customer or markets as possible. The task for management will be to create information flows sufficient to monitor these exchanges, and if necessary to take corrective action. The dictates of flexibility, however, will be sufficient enough to release decision making to the areas and levels where it will be the most effective.

This will increasingly make the task of top management more esoteric than ever before. Freed from the dictates of day-to-day operational decision-making, top management will be increasingly faced with the question of strategically managing the firm in a fluid, chaotic environment. The speed at which environmental conditions are likely to evolve will require building dynamic flexibility (Hitt, Keats & Demarie, 1999). In hypercompetitive markets

(D'Aveni, 1994), the construction and erosion of the competitive advantage cycle will be short and increasingly discontinuous.

Virtuality

Another result of the further decentralization of organizations should be the creation of virtuality in and around the organization. Rather than rigid, formal structures, virtuality enables the organization and its partners the flexibility to respond quickly in chaotic environments:

The central feature of virtual organizations is their dependence on a federation of alliances and partnerships with other organizations...The practice of permeating organizational boundaries through partnerships and alliances has enabled virtual enterprises to realize tremendous advantages...virtual organizations use the federation concept as their primary principle of organizing.

(Boudreau, et.al., 1998, p.121)

One consequence of the increased reliance upon virtuality will be what can be termed The Leadership Imperative. Organizations, abandoning hierarchy in favor of coalition, will become increasingly reliant upon the human element to manage these complex sets of shifting relationships. Rather than forsaking leadership, organizations and managers will be called upon to lead and manage an often horizontal set of shifting relationships. Lacking the control apparatus of formal organization, leaders will have to find common ground among disparate groups and, increasingly global cultures and sub-cultures. In order to manage virtual relationships, leaders will become more critical to success than ever (Computers and Wages, 1999).

A larger implication for virtuality, both within and outside the organization, is transparency. Transactions that used to be hidden from view, actions that were once considered

private and secrets that once were regarded as proprietary, will become transparent to view. Symptoms of increased transparency include electronic surveillance of private actions, Internet release of proprietary documents, and a reduction of both margins and transaction costs in Internet transactions. Transparency in many ways will force increased accountability and sensitivity to public perceptions on the part of organizations.

From a societal perspective, virtuality has another, subtler, impact. Gradually, images are becoming more important than other forms of communication. Indeed, in the milieu of the Internet, images are the reality. Images of reality are in fact becoming more important to society than the underlying reality itself (Lash, 1990). America Online exists only in the glow of cyberspace.

Commodification

While a man selling his kidney over the E-Bay website may be regarded as an isolated, aberrant phenomena, it is in fact a symptom of a much larger phenomena. These phenomena can be regarded as symptoms of commodification (Lash, 1990). The example of a man selling his kidney over the E-Bay website is only a more dramatic example of this phenomena. The societal changes resulting from increased interconnectivity that are now being felt will accelerate in the future.

From the consumption side, commodification comes from a concern of the consumer not with the concrete and specific use-value of a product, but with the price that a product will fetch on the market, i.e. with its exchange-value, an abstract and general quality. Commodification also means...the power of things over people and the importance attributed to commodities in capitalism as opposed to human beings. This power is mostly due to the qualities that products possess as exchange value.

(Lash, 1990, p. 48)

Commodification implies the creation of markets and exchange mechanisms for everything, including human kidneys. This is but one symptom of a post-modern society (Lash, 1990).

Post-modern theories and thinking at the end of the 20th century have begun to make inroads into many academic disciplines, including architecture (Benjamin, 1973), philosophy (Foucault, 1979) and sociology (Lash, 1990). In the management discipline, post-modern researchers have explored a number of topics, including the role of women (Calas & Smircich, 1993), multiple and marginalized voices in the organization (Boje, 1995), the dualistic paradigm in organizational research (Knights, 1997), total quality management (De Cock, 1998) and the theory of the firm (Li, 1998). Organizational theory, in the traditional sense, has come under assault in many of these approaches.

To have the whole of organizational theory “deconstructed” by post-modern theorists can be somewhat disconcerting. It implies a paradigm shift away from a positivist, deterministic worldview. This is precisely an argument made to reject the post-modern deconstructionists. “First there is the argument that dualistic thinking privileges those forms of knowledge that appear most compatible with the episteme of representation and consequently the physical sciences over the social sciences” (Knights, 1997, p.3). The social sciences, in other words, achieves their validity and respectability as an academic discipline by an emulation and imitation of the physical sciences. Positivism and determinism, it follows, should then become the dominant paradigm in the social sciences through imitating the physical sciences.

Yet the determinism and positivism attributed to the physical sciences by social scientists is no longer present. Einstein has altered the physical sciences irreconcilably. The Newtonian notions of space and time have yielded to the concept of Space Time (McEvoy & Zarate, 1996). Prediction in the physical sciences is also no longer deterministic. From the Heisenberg

Uncertainty Principle, it is never possible to know both the position and velocity of a nuclear object with absolute certainty (Kaye, 1993). At a quantum level, the act of observing an object *affects the outcome being observed* (McEvoy & Zarate, 1996).

New theoretical and empirical ground has also been broken in the area of chaotic and complex systems (Kaye, 1993; McKelvey, 1999). Unstable, aperiodic feedback in deterministic systems has been demonstrated to yield chaotic, that is to say indeterminate, solutions (Sardar & Abrams, 1998). Absolute prediction, therefore, is impossible (Phelan, 1995). Yet understanding has begun to emerge. At the edge of chaos, complex systems emerge that begin to show predictable behaviors (McKelvey, 1999). Chaotic and complex systems theory has been applied to everything from epilepsy (Better living through Chaos, 1999) to strategic planning (Phelan, 1995) to organizational theory (McKelvey, 1999).

The implications of these post-modern incursions into management theory and the theory of the firm are far from clear. Yet to an observer at the end of the 20th century, the argument that post-modern theories attempt to move social science away from the physical sciences may appear to be false. Indeed, if the social sciences gain their legitimacy by emulation and imitation of the physical sciences, then the move from determinism to Post-Einstein thought is being driven by the physical sciences. Perhaps it is the social sciences, and management thought in particular, that has remained isolated from the scientific breakthroughs of the 20th century.

Conclusion

With information technology beginning to increasingly integrate into our organizations, an evolution has begun to occur. Many organizations have begun to organize themselves around these new technologies, and an explosion of entrepreneurial activity has occurred. For

organizations attempting to embrace these new technologies, the changes have been swift and often wrenching (A Survey... 1996b).

What are the practical implications for managers? Will managers and management be supplanted by information technologies of the future? Hardly. The role of management will remain vital to the efficient and effective functioning of the 21st century organization. In fact, "...such far-reaching organizational innovation puts exceptional demands on managers - not as power users of Windows, heaven forbid, but as leaders of men" (Computers and Wages, 1999). The leadership imperative will be the rallying cry of future management efforts.

Today, as then, we can also, however unclearly, see it coming:

Perhaps the biggest step managers need to take is an internal, psychological one. In view of the fact that information technology will challenge many long-established practices and doctrines, we will need to rethink some of the attitudes and values which we have taken for granted... This kind of inquiry may be painfully difficult, but will be increasingly necessary.

(Leavitt & Whisler, 1958, p.47)

New challenges also require new theoretical lenses, and the flexibility to re-configure even our preconceptions to integrate with the new circumstances. Our worldview, in other words, must bear increasing examination. As a society, our communications have become increasingly visual, rather than focusing upon the written word (Lash, 1990). We may need a new set of lenses in order to regard these images clearly.

BIBLIOGRAPHY

A Survey of the World Economy: The Hitchhiker's Guide to Cybernomics - An Acknowledged Trend. (1996a, Sept. 28th). The Economist. Available: <http://www.economist.com>

A Survey of the World Economy: The Hitchhiker's Guide to Cybernomics - The End of work? (1996b, Sept. 28th). The Economist. Available: <http://www.economist.com>

Barney, J. (1996). "The Resource-Based Theory of the Firm." Organization Science, 7(5), p.469.

Benjamin, W. (1973). Charles Baudelaire. London: New Left Books.

Better Living through Chaos. (1999, September 8th). The Economist, 89-90.

Boje, D. (1995). "Stories of the Storytelling Organization: A Postmodern Analysis of Disney as 'Tamara-Land.'" Academy of Management Journal, 38(4), 997-1035.

Boudreau, M., Loch, K., Robey, D. & Straud, D. (1998). "Going Global: Using Information Technology to Advance the Competitiveness of the Virtual Transnational Organization." Academy of Management Executive, 12(4), 120-128.

Calas, M. & Smircich, L. (1993). "Unbounding Organizational Analysis: Questioning 'Globalization' through Third World Women's Voices." Paper Presented at the annual meeting of the Academy of Management, Atlanta, Georgia, USA.

Cerf, V. (1999). Computer Networking: Global Infrastructure for the 21st Century. Available: <http://www.cs.washington.edu/homes/lazowska/cra/networks.html>

Computers and Wages. (1999, September 11th). The Economist, p.85.

D'Aveni, R. (1994). Hypercompetition: Managing the Dynamics of Strategic Maneuvering. NY, NY: The Free Press.

De Cock, C. (1998). "It seems to fill my Head with Ideas: A Few thoughts on Postmodernism, TQM and BPR." Journal of Management Inquiry, 7(2), 144-153.

- Delgado, R. (1999, September 3d). "EBay cuts off Internet auction of kidney." San Francisco Examiner. Available: <http://www.sfgate.com>
- E-Commerce. (1999, July 12th). Wall Street Journal, p. R1-R30.
- Fama, (1980). "Agency Problems and the theory of the Firm." Journal of Political Economy, 88, p. 288-307.
- Fordahl, M. (1999, August 30th). "First link of future Internet born without fanfare in summer of '69." San Francisco Chronicle. Available: <http://www.sfgate.com>
- Foucault, M. (1979). *Discipline & Punish: The Birth of the Prison*. NY, NY: Vintage Books.
- Gasparino, C. (1999, July 13th). "Merrill Lynch's President Abruptly Quits - Allison's Departure Raises Questions about Succession to No. 1 Post." Wall Street Journal, p. C1.
- Grant, R. (1996). "Toward a Knowledge-Based Theory of the Firm." Strategic Management Journal, 17(S2), 109-122.
- Hitt, M., Keats, B. & DeMarie, S. (1998). "Navigating in the new Competitive Landscape: Building Strategic Flexibility and Competitive Advantage in the 21st Century." Academy of Management Executive, 12(4), 22-42.
- Hoskisson, R., Hitt, M., Wan, W. & Yiu, D. (1999). *Theory and Research in Strategic Management: Swings of a Pendulum*." Journal of Management, 25(3), 417-456.
- How real is the New Economy? (1999, July 24th). The Economist, p.17.
- Ireland, R. & Hitt, M. (1999). "Achieving and Maintaining Strategic Competitiveness in the 21st Century: The Role of Strategic Leadership." Academy of Management Executive, 13(1), 43-57.

Jensen, M. & Meckling, W. (1976). "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." Journal of Financial Economics, 3, 305-360.

Kasparov vs. Deep Blue: The Rematch. Available:
<http://www.research.ibm.com/deepblue/home/html/b.html>

Kaye, B. (1993). *Chaos & Complexity*. NY, NY: VCH Publishers, Inc.

Knights, D. (1997). "Organization Theory in the age of Deconstruction: Dualism, Gender and Postmodernism Revisited." Organization Studies, 18(1), p. 1-19.

Lash, S. (1990). *Sociology of Postmodernism*. NY, NY: Routledge, Chapman & Hall, Inc.

Leavitt, H. & Whisler, T. (1958). "Management in the 1980's." Harvard Business Review, November-December, 1958, p.41-48.

Lei, D., Hitt, M., & Bettis, R. (1996). "Dynamic Core Competencies through Meta-Learning and Strategic Context." Journal of Management, 22, 549-569.

Li, P. (1998). "Towards a Geocentric Framework of Organizational Form: A Holistic, Dynamic and Paradoxical Approach." Organization Studies, 19(5), p. 829-861.

Liebesskind, J. (1996). "Knowledge, Strategy, and the Theory of the Firm." Strategic Management Journal, 17(S2), 93-107.

March, J. & Simon, H. (1958). *Organizations*. New York: Wiley.

McEvoy, J. & Zarate, O. (1996). *Introducing Quantum Theory*. NY, NY: Totem Books.

McKelvey, B. (1999). "Complexity Theory in Organization Science: Seizing the Promise or becoming a Fad?" Emergence, 1(1), 3-32.

McWilliams, G. (1999, August 18th) "Dell Computer's Income Surges 47% as Revenue Rises 42% at PC Maker." Wall Street Journal. Available: <http://interactive.wsj.com/archive>

Pfeffer, J. (1981). *Power in Organizations*. Marshfield, MA: AHM Publishing.

Phelan, S. (1995). "From Chaos to Complexity in Strategic Planning." Presented at the Meeting of the Academy of Management, August 6-9, 1995, Vancouver, BC, Canada. Available: <http://www.aom.pace.edu/bps/Papers/chaos.html>

Polyani, M. (1966). *The Tacit Dimension*. New York: Anchor Day.

Porter, M. (1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. New York: The Free Press.

Puffer, S. (1999). "Global Executive: Intel's Andrew Grove on Competitiveness." Academy of Management Executive, 13(1), 15-24.

Robbins, S. (1990). *Organization Theory: Structure, Design & Applications*. Englewood Cliffs, NJ: Prentice-Hall.

Sardar, Z. & Abrams, I. (1999). *Introducing Chaos*. NY, NY: Totem Books.

So the Elephants Danced. (1998, Aug. 1st). The Economist. Available: <http://www.economist.com>

Spender, J. (1996). "Making Knowledge the Basis of a Dynamic Theory of the Firm." Strategic Management Journal, 17(W), 45-62.

The Heyday of the Auction. (1999, July 24th). The Economist, p.67-68.

The Net Imperative. (1999, June 26th). The Economist. p. S1-S40.

Thompson, J. (1967). *Organizations in Action*. New York: McGraw Hill.

- Tsoukas, H. (1996). "The Firm as a Distributed Knowledge System: A Constructionist Approach." Strategic Management Journal, 17(W), 11-25.
- Wernerfelt, B. (1984). "A Resource-Based View of the Firm." Strategic Management Journal, 5(2), 171-180.
- Williamson, O. (1975). *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: The Free Press.
- Woodward, J. (1965). *Industrial Organization: Theory and Practice*. London: Oxford University Press.
- Work in Progress. (1999, July 24th). The Economist, p.21-24.
- Wysocki, B. (1999a, May 17th). "It isn't time to bury the 'New' Economy just yet". Wall Street Journal, A1 (5).
- Wysocki, B. (1999b, May 10th). "Corporate Caveat: Dell or be Delled". Wall Street Journal