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Paradigms gained

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This major paradigm shift which we discussed in the last issue of *Imprints* has a number of implications that will impinge on our work and our lives in general. The future has not happened yet and there is no way anyone can predict it with great certainty. Of necessity, this section is based on subjective interpretation of objective facts. While interpreting the implications of the facts we reviewed thus far, I have attempted to remain as close to the facts as possible. Given below is my summary of how the future is likely to unfold as we move from the mass manufacturing paradigm to the information technology paradigm.

1. Everyone will 'go back to square one'
Operating within a paradigm requires certain skills. When a paradigm changes, so do the skills required to operate within that paradigm. Suddenly, the skills that have been acquired over the years become much less important. For example, an excellent typist might have been sought after in the pre-computer age; but in the computer age, as more and more executives type their own letters and reports, a person with outstanding typing skills may find that his or her skill is of little consequence. Since a major paradigm shift radically changes the framework within which an individual operates, a paradigm shift implies realignment of skills.

When a major paradigm shift occurs, everyone-no matter how skilled - 'goes back to square one'. To prosper under the new paradigm, a new set of skills are needed. This is true of individuals and-to a lesser extent-of nations. The Exhibit on the next page shows the market share of the top 5 countries in high technology industries. While the United States is still a leader, its supremacy is being challenged by other countries, among them many small Pacific rim countries such as Hong Kong and Taiwan.

Everybody's going back to square one is good news for those who are willing to play the game for it gives them a fresh chance. It is not so good for those who don't want to play the game and yearn for the 'good old days'.

2. People won't be unemployed but will be employed differently
It is somewhat scary to note the pace at which jobs have been disappearing. As we saw earlier, we can produce goods and services much faster and much less expensively than we did a few years ago. This means that we need a much smaller workforce to produce the same goods and services we produced a few years ago. Therefore, it is unlikely that the jobs that are currently disappearing will ever appear again, even when the major world economies renew their growth.

This may give the impression that as technology gets more and more efficient, fewer and fewer people will find employment. But this does not have to be so. For instance, we saw earlier that in many areas of food production, we need less than 5% of the workforce now compared to some 70 years ago. However, employment in the food industry has not shrunk. With increased efficiency two things happened. First, the work week became shorter. Employees worked longer hours in the early days of this century compared to now. Two, a number of jobs which did not exist in the early days of food production-such as PR, advertising, lobbying, marketing, marketing research, legal counsel, community relations-came into being.

Many new paradigms can be viewed as substitutes for old paradigms. A new paradigm grows at the expense of an old one. When a new paradigm comes into being, on a superficial level, it might look as though the old patterns have disappeared. However, there are some underlying constants. These are maintained through substitution. For example, over the years, writing letters declined but phone calls increased; another example, fossil based energy has been replaced by renewable energy.

When the present does not resemble the past, the difference may be more apparent than real. For instance, while the permanent job loss in many organizations (such as IBM and General Motors) may appear to indicate that jobs are being lost permanently in our society, it may well be that jobs are growing in areas or in industries that did

not exist about 20 years ago. If we fail to see this (i.e. not understand the constant), we may find ourselves in a strange situation: high unemployment on the one hand and not enough qualified people to fill a large number of positions elsewhere.

Actual figures support this model. Between 1984 and 1990 'knowledge workers' have been gaining in numbers while manufacturing production workers have been decreasing. Knowledge workers are professionals such as doctors, engineers, lawyers, accountants and actuaries; engineering, scientific and technical workers; and the very senior ranks of management (Beck 1992). While jobs that are related to the old economy will not return, new jobs will be created to sustain the new paradigm. While production and manufacturing jobs are disappearing, the demand for 'information workers' or 'knowledge workers' has been increasing.

Leaders of the New Economy

Microelectronics

1980		*1989*	
U.S.	18.3	Japan	22.1
Japan	13.2 10.1	U.S.	21.9
Singapore	8.9	Malaysia	8.9
Malaysia		S. Korea	7.4
W. Germany	8.4	W. Germany	
			5.8

Computers

1980		*1989*	
U.S.	38.6	U.S.	24
W. Germany		Japan	17.5
U.K.	11.5	U.K.	9.0
France	10.4	W. Germany	
Italy	8.6	Taiwan	6.9
	6.6		5.8

Aerospace

1980		*1989*	
	47.6	U.S.	45.8
U.S.	19.7	W. Germany	
U.K.		U.K.	12.5
W. Germany	9.1	France	10.9
France	6.0	Canada	10.2
Canada	4.4		4.4

Telecommunications

1980		*1989*	
W. Germany			24.7
Sweden	16.7	Japan	
U.S.	15.3	W. Germany	9.5
Japan	10.9	U.S.	8.8
Netherlands	10.3	Sweden	8.1
	9.3	Hong Kong	6.3

Machine Tools & Robotics

1980		*1989*	
W. Germany		Japan	23.3
U.S.	25.8	W. Germany	
Japan	14.1	U.S.	20.8
Sweden	11.3	Italy	12.1
Italy	9.1	Switzerland	10
	8.7		8.4

Scientific/Precision Equipment

1980		*1989*	
U.S.	28.3	U.S.	25.2
W. Germany		W. Germany	
U.K.	18.1	Japan	18.5
France	9.4	U.K.	12.9
Japan	8.0	France	9.6
	7.1		5.6

Medicine & Biological

1980		*1989*	
W. Germany	16.7	W. Germany	
Switzerland U.K.	12.5	Switzerland U.S.	15.6
France	12	U.K.	12.2
U.S.	11.9	France	12.2
	11.4		11.8
			10.3

Organic Chemicals

1980		*1989*	
W. Germany	19.1	W. Germany	17
U.S.	13.9	U.S.	15.5
Netherlands	10.9	France	8.7
France	10.7	Netherlands	8.1
U.K.	8.4	U.K.	8.4

All figures are percentages. Source Kennedy (1993)

The lesson is obvious. The mass manufacturing sector, which has reached its peak, is hardly growing any more. In its wake we have a growing information sector which is employing more and more people. If you want to get in on the ground floor of this new paradigm, become a knowledge worker. Technoliteracy and numeracy will be the minimum requirement to be a part of the new paradigm.

3. Work will be characterized by mobility
Future work will be characterized by mobility. Future paradigms, like those of the past, will relate to mobility. During the agricultural revolution, people moved to where the land was. During the mass manufacturing era, things were standardized and goods became highly mobile. A light bulb made in Nova Scotia could fit into a socket in a household in Alabama. Standardization made goods, such as spare parts for any kind of machinery, highly mobile. The information technology paradigm that we are now entering is also characterized by changes in mobility. In particular, we can anticipate three kinds of mobility.

We won't have to work from central locations
The purpose of centralized offices has been to share resources such as files, phones, photocopiers and faxes. This model has some costs such as:

- We have to commute to work every day whether we like it or not.
- This model cannot easily accommodate people who want to work a fixed number of hours each week, but not during the same hours each day.

Consequently, this model wastes a considerable amount of human time and human resources.

The current technology makes sharing of common resources unnecessary. Phones, photocopiers and faxes can be owned by individuals at minimal cost. To access files, one does not have to go to a central location-each person who is involved in a project can individually have a complete file on the subject. Modems, faxes and scanners make this possible. Complete information is made possible through commercially available data networks.

These developments would make centralized offices less important in terms of sharing resources. It would enable people to work from where they live, if they so choose. Centralized offices probably will continue to exist to fulfil the human need to get together. But they will lose their importance from a purely business point of view.

We won't be tied to large corporations
Since businesses will become knowledge based and the resources to run businesses will become inexpensive and universally available, individuals will be at less of a disadvantage when competing with a large corporation. For example, in the manufacturing paradigm, a small manufacturer of widgets is at a tremendous disadvantage compared to a larger manufacturer whose resources enable them to buy better and more expensive machinery and to produce widgets more inexpensively. In the information paradigm, on the other hand, a small group of individuals can have as much knowledge as a large corporation and can challenge them-as evidenced by the fact that Apple, Dell and Microsoft were started by (then) unknown individuals and ended up being very powerful within a very short period of time.

Because people do not necessarily have to physically come together in and have a central location to form a corporation, a more 'virtual corporation' will come into being. (A virtual corporation can be roughly described as a corporation-like structure created for the purpose of accomplishing a given task. A virtual corporation could be a group of (unrelated) consultants who come together and act as a single entity for the purpose of completing a project.)

Work won't necessarily be centred in advantaged locations

In the manufacturing era, movement to new jobs was restricted by immigration policies. The information era shifts work from one country to another with no real restriction. For instance, one of the major software development centres for Texas Instrument is in India (Fortune 1993). Insurance companies in New Jersey are setting up their data processing offices in Ireland (Toulin 1993). Jobs were exported thousands of miles away with very little fuss. A corporation can employ a knowledge worker anywhere in the world. And many corporations do, especially when there is a wide wage disparity for the same quality of work.

We will be moving into a borderless world. Jobs will move from offices to residences, from large corporations to individuals and from one country to another.

4. Generalists will be in greater demand
The manufacturing paradigm was dominated by specialists-people who knew a great deal about one small

specific aspect of a subject. The advent of the information age makes it possible for anyone to access any specialized information. A lawyer can access an obscure fact in minutes that will help him or her argue a current case; a scientist can access up to date information on what is happening in his or her field of endeavour without having to keep track of the developments; a homeowner can have access to a computer database which explains how to fix a kitchen appliance. Instant access to specialist information will decrease the importance of experts. Generalists or people who know where to look and who know how things fit together, on the other hand, will gain greater importance.

Human intelligence will be in demand for a long time to come. It is not enough to be simply a part of the new paradigm. One should know how things fit together and how to manage things. Being a part of the new paradigm is a necessary condition for being successful in the new economy but not a sufficient condition. Anyone who doubts this need only look into heavy losses posted by high technology and computer companies in 1993-Apple, IBM, Dell and Northern Telecom, to name just a few (Wall Street Journal, July 1993; Fortune, 1993).

5. The manufacturing paradigm will continue to exist for a while

Countries that formed the former Soviet Union, East European nations and countries like India and China still do not have an extensive infrastructure in terms of housing, roads, communication etc. Yet it won't take them long to shorten the gap while simultaneously working on the new paradigm. For instance, about 200 years ago, it took nearly 60 years (from 1780 to 1838) for Britain to double its output; it took nearly 20 years (from 1961 to 1979) for Brazil to double its output ; but it took only 10 years (between 1977 to 1987) for China to double its output. (The above data were collected from a variety of statistical sources.) No matter how fast the less developed countries fill the gap that is still to be filled, opportunities exist for those trained in the old paradigm, provided they are willing to be mobile.

6. We will move into an era of unprecedented growth and/or quality of life

The new paradigm has already started to create enormous wealth. It is estimated that Microsoft-the symbol for the new paradigm-helped over 2,000 of its employees become millionaires and some (such as Paul Allen and Steve Ballmer) even billionaires. Other prominent billionaires in this industry include Ray Noorda of Novell and Larry Ellison of Oracle. Not many companies in any era can boast of such wealth creation. Microsoft may be the most visible example but there is no shortage of self-made millionaires in their twenties who exemplify the wealth being created by the new paradigm.

We are still in the early stages of the new paradigm. As national (economic) barriers break down in the global and information-based economy, there will be greater optimization of resources. As machines (such as robots and computer-based designs) aid the manufacturing processes, costs of goods will decrease further. Just as we worked far fewer hours during the industrial era as opposed to the agricultural era, we can afford to work even fewer hours in the information era. Robots in the assembly line don't need holidays, need no pension or health benefits and can easily be replaced. Brain power can be bought in parts of the world where it is least expensive. Two way electronic communication between consumers and manufacturers/retailers and electronic scanners will tell businesses what consumers want, when and how much. This will enable industries to reduce unnecessary inventory buildup, thereby reducing the cost even further.

Virtual reality technology will enable people to experience many things, albeit vicariously. Through this technology, people will experience more things than was ever before possible in human history.

As a result of such profound and rapid changes we will experience equally profound social changes. It took nearly 200 years for the Industrial Revolution to change the way we live. The Information Revolution is expected to accomplish a more radical transformation in a much shorter time frame. While our working hours can potentially be shortened, we will have greater freedom to live where we like. It will not be necessary to live close to our place of work. Reduced work hours and freedom to live where one likes can be used either to make more money or to increase the quality of one's life or both. Because we are at the beginning stages of a major paradigm-which shows clear signs of being a super paradigm-we might expect a long period of sustained prosperity.

There will indeed be many more changes. They will be of particular relevance to marketing and research professionals. Information technology will enable us to know more about a person's behaviour than current marketing research. As consumer behaviour can be measured more precisely and be immediately correlated with demographic and other factors, we will be in a better position to fulfil consumer needs. We will be able to reach

consumers much more cost-effectively.

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