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Chapter I

The Need to Measure the Value of Information Technology

Living as we do in the Information Age, an immense amount of information is readily available through high-powered workstations, laptop computers, Personal Digital Assistants (PDAs), and other smart devices, connected through high-bandwidth data communication networks, including the Internet, Wide Area Networks (WANs), Local Area Networks (LANs), and upcoming Personal Area Networks (PANs). Evolving technologies are directly changing the speed and shape of competition and how business is done, rewriting the rules of the game in industry after industry. The rate of change in today's business environment has pushed the need for technologies and acceptance of them to a continuously accelerating pace. The new technologies are enabling organizations to be flatter, networked, and more flexible, redefining our notions about everything from R&D to distribution, and in the processes making possible smarter, more customized products and services.

As a result of these forces, organizations spend enormous sums of money on computer hardware, software, communication networks, databases, and specialized personnel, collectively known as Information Technology (IT). Leading-edge companies all over the world in all industries have increased their overall IT expenditures by double-figure percentages annually. Many organizations currently observe that up to 50 percent of their total capital expenditure is for IT.

Yet there is a great deal of questioning and soul-searching about the payoff of these large investments in IT. The question of what companies are getting in return for the many dollars or euros they spend on IT remains unanswered. Does IT yield tangible productivity, or strategic benefits? And are they measurable?

Scholars, researchers, business managers, and consultants have divergent views about the business value of IT investments. A host of annual surveys by consulting companies, market research groups, and the like, as well as a more limited number of formal research studies, give contradicting answers to the

question of whether investments in IT are worthwhile. Some investigations reveal severe discouragement about IT investments, while other studies demonstrate that they have a better return than any other sort of investment. It is clear that to date, research results provide little evidence of a correlation between IT investments and business performance. Nor does a uniform answer exist to the question of whether it is possible to measure the value of IT.

ATTEMPTS TO MEASURE THE VALUE OF IT

Many attempts have been made to measure the value of IT according to a variety of criteria. Brynjolfsson, a leading researcher in the field of IT economics, in 1993 summarized the principal studies of IT and productivity at that time. Brynjolfsson concluded that: "The relationship between information technology and productivity-the fundamental economic measure of a technology's contribution-is widely discussed but little understood." He termed the shortfall of evidence of increased business productivity through IT the "*productivity paradox.*"

Many of these studies address the value question at the macroeconomic level and are generally based on public data sets such as those from the U.S. Bureau of Economic Analysis (BEA), the Bureau of Labor Statistics (BLS) and Life Office Management Association (LOMA). Other studies are based on data sets such as those from the Profit Impact of Market Strategy (PIMS) research program, and Management Productivity and Information Technology (MPIT) research.

At the macroeconomic or national level, the focus is on the relationship between aggregate IT spending as input, and worker productivity in an entire sector, country, etc. as output. For example, a study performed by Roach indicates that during the 1970s and 1980s, the service sector's productivity did not increase relative to its outlays in IT. Other studies report that investments in IT have not resulted in improved productivity of the workforce in Corporate America. There is no reason to believe that this situation is different in other parts of the developed world.

Other researchers, such as Steiner, subscribe to short-term benefits of IT for an individual organization yet over that a sector's longer-term benefit of IT is not plausible at all:

> *"There's no question ... that the technology over a long period of time clearly does produce the efficiency of a particular organization. However, efficiency does not mean profitability persé. Efficiency can mean the opposite. The automation of whole industries increases the volume of transactions executed and processed, at a lower cost per unit. Industries become more efficient, causing organizations' profits to decline."*

Brynjolfsson, in writing of the productivity paradox, warns against over-interpreting the findings of the above-cited studies. A shortfall of *evidence* of IT productivity is not necessarily evidence of a productivity shortfall itself. He notes that the lack of evidence of IT productivity can be due to the relative lack of reliability of data sources, mismanagement ("not appropriately adjusting output