

Investment in Information Technology and Technology Intensity Measures

Choi, Jeong-Gil*

ABSTRACT

Advances in information technology (IT) are becoming one of the most significant driving forces changing the structure of global financial management. This phenomenon is occurring in all industries; the hotel industry is no exception and must quickly adapt to this new trend. This study examines the technology intensity of the industry by assessing the degree to which the industry has allocated capital to IT projects, and discusses IT investment in the hospitality industry with a particular emphasis on assessing the value of IT investment and its investment strategy.

Keywords: Information technology, Technology Intensity Measure (TIM), Hotel industry, Investment strategies.

Introduction

The advances in information technology, together with financial deregulation abroad (the removal of regulatory structures which inhibit competition and protect domestic markets) have blurred the distinction between domestic and foreign markets. As the necessary electronic technology and corresponding infrastructure have been developed and implemented, the cost of financial transactions throughout the world has plummeted. Geographical and currency diversification allow multinational firms to minimize fluctuations in returns due to business cycles, to maintain or improve their competitive positions in the face of foreign exchange rate changes, to reduce the impact of political interference, to diversify the risk of technological obsolescence, and to minimize their cost of capital (Eiteman, Stuehll, & Moffett, 1992). Consequently, the world has become one vast, interconnected market; the economy is truly a

* Professor Kyung Hee University

global or transnational economy.

The convergence of information technology and telecommunications have greatly reduced the costs of obtaining, processing, and sharing information about the conditions that affect the creditworthiness of potential borrowers. Most analysts now have affordable, computerized access to a wealth of economic and financial information, along with programs to store and manipulate this information. Sophisticated software applications also assist analysts in wading through volumes of data quickly and efficiently to discern meaningful patterns and relationships. To keep pace with these trends and capabilities, international hotel companies must acquire these same tools and technologies. Otherwise, they will be left behind.

Nardozza (1995) defines the future information demands in the hotel industry. In his words:

“Hotel lenders may want on-line access to hotel treasury and cash management systems to daily sweep bank accounts and monitor compliance with covenants of loan agreements. Investors may want up-to-the-minute financial statement performance and make daily investment decisions. Suppliers may want on-line access to perpetual inventory records to automatically trigger purchase orders and shipments. Already, travel agents, meeting planners, and tour wholesalers want on-line access to room inventories and pricing information.”

Owners, investors, lenders, and suppliers across the globe require and demand timely information to determine their business/investment decisions and monitor their business interests or portfolios. Many hotel companies want direct access to the flow of business and financial information. In a fast-paced world and a hypercompetitive environment, the demands for timely information are increasing dramatically.

The hospitality industry has traditionally been a follower when it comes to the application of IT. However, this is changing; the role of IT is growing throughout the industry as the result of competitive pressures, more affordable and easier-to-use technologies, and guest demands. The industry's reliance on IT, however, has not been well quantified in the literature. Consequently, there is much ambiguity surrounding the tangible benefits derived from IT and, more specifically, the return on investment.

Although the trade literature debates the importance of the technology in the hotel industry, the specific IT investment strategies are generally not discussed.

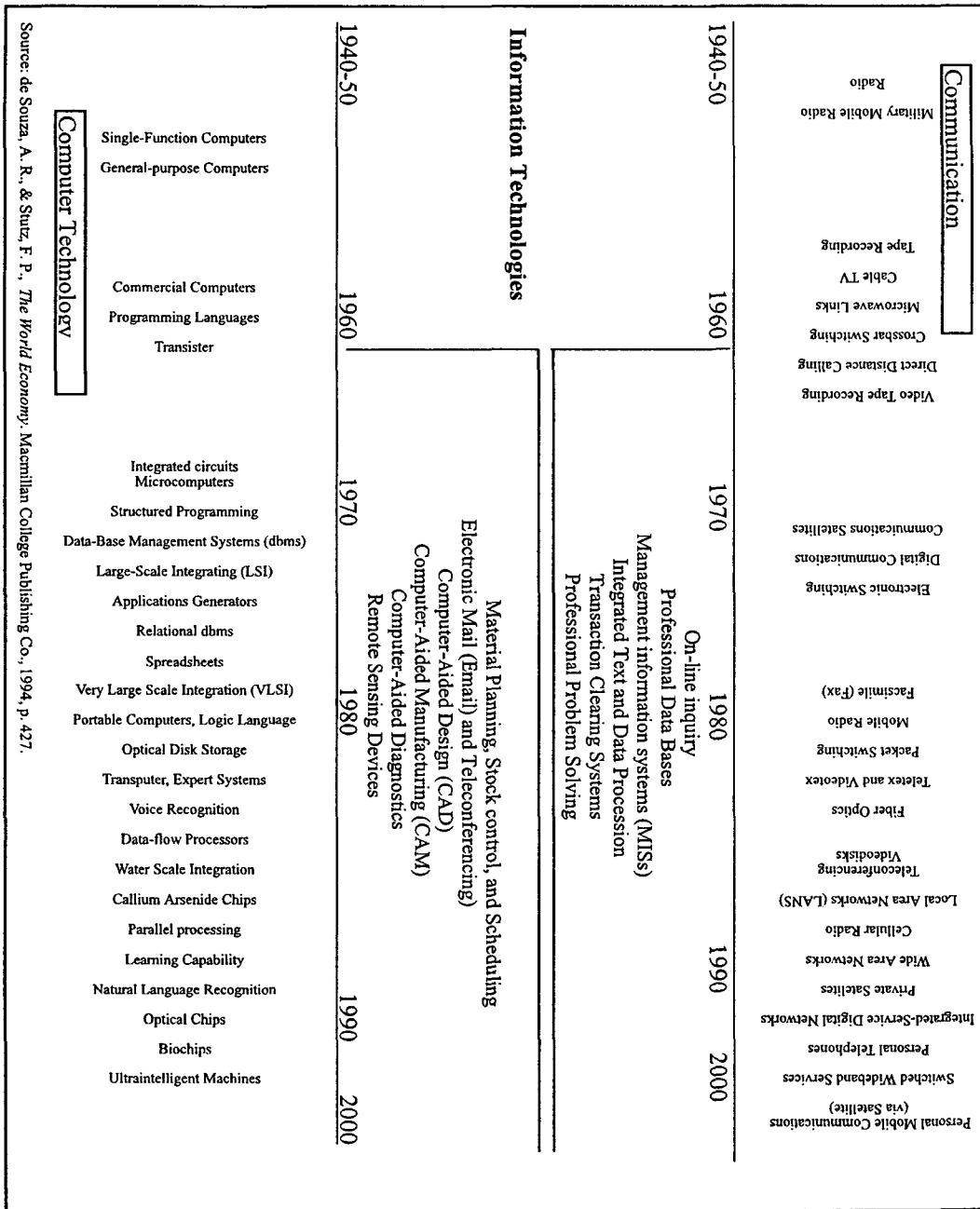
A special economic study conducted by Roach (1987) assessed the technology-productivity connection. In the study two variants of what can be called “technology intensity measures” (or TIMs) have been constructed that provide a uniform assessment of relative shifts in technology endowment. TIM1 compares the speed by which various industries have increased the technology share of their capital stock relative to average endowments prevailing in the 1970s; TIM2 compares each industry’s 1985 high-tech endowment with the average for industry as a whole. Thus, each variant captures somewhat different dimensions of the shift into technology: TIM1 looks at movements in the high-tech content of each industry’s capital stock, whereas TIM2 is more of a static snapshot of the relative dispersion of industry’s technology endowments in 1985.

With the hotel industry, as a focal point of this study, the authors examine the degree to which the industry has allocated capital to IT projects and assess the technology intensity of the industry. Matching up productivity changes with two measures of technology intensity reveals much about the role of technology in the hotel industry. Finally, IT investment strategies and economic benefit analyses techniques are discussed.

Information Technology

Technology refers to work performed in organizations and to the application of knowledge to improve how this work is performed (Perrow, 1967). In the industrial sense, organizations are viewed as systems for processing work. They facilitate the transformation of inputs (e.g., people, raw materials, or other resources) into desirable outputs. Technology facilitates this transformation and is often the most important variable contributing to the success of a firm. This line of thinking has been used in the growth formulas of most hotel industry firms.

Fig. 1: The Challenge of New Technologies



Source: de Souza, A. R., & Stutz, F. P., *The World Economy*. Macmillan College Publishing Co., 1994, p. 427.

There are many types of technologies that exist, including process technology, communications technology, and information technology. The convergence of information technology (hardware, software, etc.) and communications technology (networking) is yielding the most profound effect on today's economy and will continue to do so over the course of the future. This convergence is not a new trend but rather an evolutionary one. It dates back to the early 1960s (de Souza & Stutz, 1994). Figure 1 illustrates the tremendous changes in information technology during the last 40 years.

Information Technology and the Hotel Industry

Technology is rapidly changing the face of most industries, and the hotel industry is no exception. Today's hotelier cannot ignore the implications of IT (Olsen, Tse, & West, 1992). According to research conducted Michael Olsen (1996), IT is the most dominant force impacting the hospitality industry, and moving forward, IT will be the most important competitive method for any organization. In addition to being an event, technology is also interwoven with and underlying many of the other major events driving change in the hospitality industry. These forces include capacity control, safety and security, assets and capital, and a new management style. Thus, it can be said the hotel of the future will be technology driven. Analyzing how much capital has been allocated to technology by the industry can support this statement.

Table 1 provides a detailed, industry-by industry assessment of shifting trends in the stock of information technology capital in the service sector including the hotel industry.

The service sector as a whole owned 84 percent of the U. S. economy's total stock of information technology capital in 1985. Within services, about 45 percent of this capital can be found in the communications industry, which reflects the sizable investment in a nationwide telephone system. The finance and real estate sectors fall on the next rung down the ladder, accounting for almost 25 percent of the total service sector's technology capital in 1985. Other large owners of such capital include wholesale trade, business

services, and healthcare providers. In comparison, the hotel industry represented only a small portion of the information technology capital in that same year, approximately 0.3 percent (\$0.9 billion) of the total technology capital in services sector (\$356.9 billion).

Table 1: Where is America's Information Technology Capital?(Billions of Constant 1982 Dollars)

Business Sector	1950s	1960s	1970s	1985
All Industries	28.8	61.5	142.7	423.6
Goods producing	4.7	6.4	17.2	66.7
Service providing	24.1	55.1	125.5	356.9
-Transportation	1.0	1.2	1.5	3.1
-Communications	10.5	30.6	73.4	159.7
-Public utilities	0.8	1.4	3.9	13.4
-Total trade	0.5	1.1	5.7	41.1
-Finance, insurance, and real estate	8.1	13.7	24.6	90.3
-Services:	3.1	7.1	16.4	49.3
* Hotels and lodging	0.0	0.0	0.1	0.9
-- Personal	0.1	0.8	1.6	1.5
--Business	0.3	1.2	4.3	22.3
--Auto repair	0.1	0.1	0.1	0.8
--Miscellaneous repair	0.0	0.0	0.0	0.2
--Motion pictures	0.1	0.4	1.4	2.4
--Amusement and recreation	0.4	1.1	1.9	3.8
--Health	1.2	2.4	5.4	13.7
--Legal	0.0	0.1	0.1	0.7
--Educational	0.1	0.1	0.2	0.7
--Other	0.7	1.0	1.3	2.1

Adapted from Roach [3]. Note: The figures presented here represent averages over designed intervals. These numbers are estimates provided by Morgan Stanley and were derived from the Industry-Commodity Capital Matrix of the U.S. Department of Commerce.

The dispersion of information technology capital across the various industries is only a starting point in understanding the complete picture. The key question that needs to be addressed in assessing the role of these technology products is "How has an industry changed its reliance on such items as a factor of production over the years?" Table 2 addresses this issue by providing a detailed analysis of the share of each industry's total capital stock for which can be accounted by IT products.

There are many types of technologies that exist, including process technology, communications technology, and information technology. The convergence of information technology (hardware, software, etc.) and communications technology (networking) is yielding the most profound effect on today's economy and will continue to do so over the course of the future. This convergence is not a new trend but rather an evolutionary one. It dates back to the early 1960s (de Souza & Stutz, 1994). Figure 1 illustrates the tremendous changes in information technology during the last 40 years.

Information Technology and the Hotel Industry

Technology is rapidly changing the face of most industries, and the hotel industry is no exception. Today's hotelier cannot ignore the implications of IT (Olsen, Tse, & West, 1992). According to research conducted Michael Olsen (1996), IT is the most dominant force impacting the hospitality industry, and moving forward, IT will be the most important competitive method for any organization. In addition to being an event, technology is also interwoven with and underlying many of the other major events driving change in the hospitality industry. These forces include capacity control, safety and security, assets and capital, and a new management style. Thus, it can be said the hotel of the future will be technology driven. Analyzing how much capital has been allocated to technology by the industry can support this statement.

Table 1 provides a detailed, industry-by industry assessment of shifting trends in the stock of information technology capital in the service sector including the hotel industry.

The service sector as a whole owned 84 percent of the U. S. economy's total stock of information technology capital in 1985. Within services, about 45 percent of this capital can be found in the communications industry, which reflects the sizable investment in a nationwide telephone system. The finance and real estate sectors fall on the next rung down the ladder, accounting for almost 25 percent of the total service sector's technology capital in 1985. Other large owners of such capital include wholesale trade, business

services, and healthcare providers. In comparison, the hotel industry represented only a small portion of the information technology capital in that same year, approximately 0.3 percent (\$0.9 billion) of the total technology capital in services sector (\$356.9 billion).

Table 1: Where is America's Information Technology Capital?(Billions of Constant 1982 Dollars)

Business Sector	1950s	1960s	1970s	1985
All Industries	28.8	61.5	142.7	423.6
Goods producing	4.7	6.4	17.2	66.7
Service providing	24.1	55.1	125.5	356.9
-Transportation	1.0	1.2	1.5	3.1
-Communications	10.5	30.6	73.4	159.7
-Public utilities	0.8	1.4	3.9	13.4
-Total trade	0.5	1.1	5.7	41.1
-Finance, insurance, and real estate	8.1	13.7	24.6	90.3
-Services:	3.1	7.1	16.4	49.3
* Hotels and lodging	0.0	0.0	0.1	0.9
-- Personal	0.1	0.8	1.6	1.5
--Business	0.3	1.2	4.3	22.3
--Auto repair	0.1	0.1	0.1	0.8
--Miscellaneous repair	0.0	0.0	0.0	0.2
--Motion pictures	0.1	0.4	1.4	2.4
--Amusement and recreation	0.4	1.1	1.9	3.8
--Health	1.2	2.4	5.4	13.7
--Legal	0.0	0.1	0.1	0.7
--Educational	0.1	0.1	0.2	0.7
--Other	0.7	1.0	1.3	2.1

Adapted from Roach [3]. Note: The figures presented here represent averages over designed intervals. These numbers are estimates provided by Morgan Stanley and were derived from the Industry-Commodity Capital Matrix of the U.S. Department of Commerce.

The dispersion of information technology capital across the various industries is only a starting point in understanding the complete picture. The key question that needs to be addressed in assessing the role of these technology products is "How has an industry changed its reliance on such items as a factor of production over the years?" Table 2 addresses this issue by providing a detailed analysis of the share of each industry's total capital stock for which can be accounted by IT products.

Table 2: Information technology Capital as a Share of Each Industry's Overall Capital Stock

Business Sector	%				%	1985 vs.
	1950s	1960s	1970s	1985	Change: % point	Ratio*
All Industries	2.5	3.7	5.8	12.5	6.7	2.2
Goods producing	1.1	1.1	2.0	6.1	4.1	3.0
Service providing	3.3	5.2	7.7	15.5	7.8	2.0
-Transportation	0.4	0.5	0.6	1.1	0.5	1.9
-Communications	20.0	30.6	40.8	53.4	12.6	1.3
-Public utilities	0.5	0.6	1.1	3.1	2.1	2.9
-Total trade	0.7	0.9	2.5	11.1	8.7	4.5
-Finance, insurance, and real estate	6.1	5.7	6.0	14.4	8.5	2.4
-Services:	5.8	6.5	8.3	16.1	7.9	2.0
* Hotels and lodging	0.1	0.1	0.1	1.7	1.6	11.5
-- Personal	2.7	9.3	13.6	11.5	-2.1	0.8
--Business	5.1	7.9	10.9	28.4	17.5	2.6
--Auto repair	0.6	0.5	0.2	1.5	1.3	7.6
--Miscellaneous repair	0.5	0.4	0.5	2.7	2.2	5.3
--Motion pictures	8.3	15.0	31.5	42.2	10.6	1.3
--Amusement and recreation	5.3	9.7	12.3	19.7	7.4	1.6
--Health	21.2	16.0	19.2	29.5	10.3	1.5
--Legal	1.9	2.9	4.0	13.3	9.3	3.3
--Educational	10.0	9.5	12.2	46.8	34.6	3.8
--Other	19.0	10.0	6.6	10.5	3.9	1.6

* 1985/1970s average. Adapted from Roach [3]. Note: The figures presented here represent averages over designed intervals. These numbers are estimates provided by Morgan Stanley and were derived from the Industry-Commodity Capital Matrix of the U.S. Department of Commerce.

In the 1950s through the 1970s, the hotel industry shared only 0.1 percent of its overall capital stock in information technology. In 1985, on the other hand, the industry had about 1.7 percent of its stock invested in such technologies. The industry had experienced a sizable increase in its reliance on information technology as a factor of production.

Roach (1987) analyzed the technology intensity of each industry. The measures were derived from the Industry-Commodity Capital Stock Matrix of the U.S. Department of Commerce. Two different TIMs have been constructed in an effort to provide a uniform assessment of relative shifts in information technology endowment. TIM1 looks at

movements in the technology content of each industry's capital stock, whereas TIM2 is more of a static picture of *the relative dispersion of technology endowment* in 1985. Table 3 presents the measures.

Table 3: Technology Intensity Measures (TIMs) and Productivity

Business Sector	<i>Technology Intensity Measure</i>		<i>Productivity Growth</i>		
	TIM1	TIM2	1973 to 1979	1979 to 1985	Change (% points)
All Industries	1.0	1.0	0.6	1.1	0.5
Goods producing	1.4	0.5			
Service providing	0.9	1.2			
-Transportation	0.9	0.1	1.5	-1.2	-1.7
-Communications	0.6	4.3	4.3	3.9	-0.4
-Public utilities	1.3	0.3	0.3	1.8	1.5
-Total trade	2.1	0.9	0.8	1.3	0.5
-Finance, insurance, and real estate	1.1	1.2	-0.1	-1.3	-1.2
-Services:	0.9	1.3	0.2	0.7	0.5
* Hotels and lodging	5.3	0.1			
-- Personal	0.4	0.9			
--Business	1.2	2.3			
--Auto repair	3.5	0.1			
--Miscellaneous repair	2.4	0.2			
--Motion pictures	0.6	3.4			
--Amusement and recreation	0.7	1.6			
--Health	0.7	2.4			
--Legal	1.5	1.1			
--Educational	1.8	3.8			
--Other	0.7	0.8			

Adapted from Roach [3]. Note: TIM1 is each industry's change in technology endowment from the 1970s to 1985, relative to the average for all industries. TIM2 is each industry's 1985 technology endowment relative to the all-industries average. Technology intensity measures are Morgan Stanley estimates derived from the Industry-Commodity Capital Matrix of the U.S. Department of Commerce; productivity detail is taken from "Multiple Productivity Indexes," published by the American Productivity Center and based on US Government Statistics.

As depicted in Table 3, the hotel industry has experienced a dramatic increase in its reliance on IT as a factor of production from the 1970s to 1985, relative to the average change for all industries. TIM1 ranks the hotel industry at the top of the services sector in terms of its ability to increase its reliance on high technology as a factor of production.

TIM2, however, ranks the industry at the bottom of the services sector in terms of the degree of its present dependence on information technology. On the other hand, TIM1 ranks communications at the bottom of the services sector in terms of its ability to increase its reliance on high technology as a factor of production. Quite simply, since the stock of information technology capital is so large in communications, it cannot possibly grow, for all practical purposes, at the rate experienced by other services providers. Based upon TIM2, the hotel industry constituted a small slice of the U.S. information technology pie up to 1985. This notwithstanding, the industry increased the technology intensity very sharply during the 1970s through 1985 based on the changes observed in TIM1.

The service sector, as seen from the vantage points of TIM1, has actually lagged other industries in increasing its technology intensity. Nonetheless, because of its high “historical” endowment, this sector has more than its fair share of technology but has a little in the way of productivity gains to show for it. Note that the service sector include not only hotel industry but also include many other industry. Therefore, the figures should be used as overall trends, not specific phenomena to the hotel industry alone. One might say that there is low level of return on investment. One thing clear is that there is more room to improve the return on IT investment.

Traditionally, hotel executives resisted the use of information technology for fear of alienating their guests. However, this trend is reversing as a result of the much technological advancement that has occurred since the personal computer was first introduced in the early 1980's. Spending on information technology by the industry is on the rise and becoming competitive with other industries. Hoteliers are recognizing the value of information technology because of its essentialness to growing market share and to responding to customer needs in a timely fashion. Each year, *InformationWeek* sponsors a study of the top 500 organizations with respect to information technology usage and spending. The 1996 study of Needle (1996) represented the first time that the

hotel industry's spending levels were significant enough to see inclusion in the study. In fact, last year's study included three hotel companies: Carlson Companies (ranked 185 with IT expenditures accounting for 4.1% of revenues), Marriott International (ranked 198 with IT expenditures accounting for 1.6% of revenues), and Hilton Hotels (ranked 222 with IT expenditures accounting for 1.2% of revenues). On average, each company is spending in excess of \$88.3 million (US) on information technology.

Investment in Hotel Technologies

As discussed above, the technological intensity of hotel industry is rising dramatically, and the role of the **information** technologies in hotel finance is growing in importance. Given these trends, one must consider how to develop investment strategies and how to evaluate IT investments. It is a given that the technologies implemented in the hotel industry must bring in more guests (thereby growing the bottom line), reduce labor or other operating costs, or improve guest service levels and customer satisfaction. The foremost forces driving technology applications in the hospitality industry today are the need to enhance the quality of service and of the guest stay and desire to improve operating efficiency². As Hansen and Owen (1995) note:

“The debate over high-tech” or “high-touch” is largely a thing of the past in the hospitality industry as emerging technologies drive unprecedented change in the way hotels operate and serve customers. It is clear that investments in technologies can generate greatly improved operating efficiencies, higher hotel revenues and enhanced guest services” (p. 1).

In **order** to maximize the benefit of IT, its applications must be well matched and aligned with a company's business strategy, image, structures, and capability. It is also important to recognize that technological change will not garner satisfactory results

² Andersen Consulting and American Hotel & Motel Association, *Looking forward: A management perspective of technology in the lodging industry*, 1989

without the commitment and involvement of the top management. This is because any technology changes involve large sums of capital and impact multiple facets of an organization. Management commitment means more than the allocation of resources; it also means a propensity to highlight the importance using IT.

Before top management considers an IT investment, they should have clear answers for the 5W, 1H questions: who, when, where, what, why, and how. Some examples of the questions that should be raised and carefully deliberated over include:

- Who is going to develop and manage the new technology initiative? Who will be impacted by the new technology?
- When is the most appropriate time for implementing a particular technology? When can the capital investment be recouped?
- Where are the best places to use the new technology?
- What applications should be considered? What technologies are customer-driven? What technologies will drive competitive advantage and profitability?
- Why should new technology be developed or purchased?
- How does one acquire new technology and the expertise required for successful implementation? How much funding is required and how should resources (capital and human) be allocated to ensure a successful and smooth transition? How should the technology investment be evaluated for success and ROI?

These questions are just a sampling and require both internal and external environmental assessments. The internal environment means everything about the organization that will use the new technology such as organization structure, people, job responsibilities, etc. The external environment refers to the remote, task, and functional environments. One must consider external trends regarding the new technology, the economy, the political environment, socio-cultural environment, regulatory requirements, etc., as well as the impact and needs of customers, suppliers, and competitors. These questions may be somewhat difficult to answer. Nevertheless, in order to maximize the benefit of the technology, these assessments are essential. Who is going to assess the environment? Who should be included in implementing new technology? The answer for these questions is senior managers. Understanding environment means understanding

potential opportunities or benefits of new technology implementation. Senior managers should be included in the systems so that their support can be garnered for a project, thereby increasing the likelihood of its implementation.

Timing is one of the most difficult decision factors. Since most of the technologies in the hotel industry are likely to become core technology, investing in the new technology may affect the long-term. Once it is implemented, the withdrawal of the investment is almost impossible. Even though a new technology is introduced today, another one can be launched tomorrow, making today's investment obsolete. Thus, the timing to invest new technology is an important consideration. Managers must also seek technologies that will not lock them into a position and preclude future growth or adaptability. With a growing trend towards more open systems, this is becoming less of a concern. Nonetheless, when investing in IT, one must always consider the future: future growth, functionality, and migration. If a technology is not flexible to adapt in an ever-changing business world, it should be avoided.

Many organizational theorists have posited the existence and importance of technology-structure relationships. Miller et al. (1991) indicate that the organizational flexibility (i.e., the ability to learn and adapt to changes in the environment and the organization's ability to cope with uncertainty) do affect the relationships between technology and its effect in the organization. In order to maximize the output of the new technology, a company will be required to develop new organizational procedures for ensuring the internal transfer of technology among departments, units, or properties. Leavitt (1965) concluded that impact of IT is far-reaching and extends to structure, people, and tasks. Selecting places to implement new technology in an organization and how it impacts the relationships among strategy, structure and resources must be taken into account when evaluating IT investments.

With technology's growing importance in every facet of hotel management, an organization's success will be determined to a large extent by how well it uses the

technology tools that are available now and adapts to those that are coming soon. Haywood (1990) explained a strategic approach to managing technology. According to Haywood, introducing a new technology means introducing new relationships, and managing technological change means managing a relationship that is changing. Hence, decisions regarding technology must be based on a clear definition and vision of the company's fundamental purpose.

Then, what applications should be considered to achieve competitive advantage? What technologies are customer-driven? Nardoza (1995) in predicting future advances in IT wrote:

“Within the next few years, consumers will have unlimited, direct access to most channels of market and business information and distribution. Consumers will want to handle daily activities and business transactions without leaving their hotels or offices using their own personal computers. Buying and selling goods and services, paying bills, researching topics of interest, handling banking transactions, and planning daily personal and business activities are all part of this change.”

In the hotel industry, many individuals will want to book personally-tailored vacation packages and business itinerary using direct links through their own personal computers. Evidence of this happening is seen today with tools like Travelocity, Expedia, and other Internet services. This will require full access to on-line facility databases and vacation catalogs, as well as price lists. Also, they require direct access to hotel and airline rooms and seat inventory control systems. This alone could revolutionize the marketing and sales paradigm for the hotel industry.

According to Nardoza (1995), technological advances in information and communication will cause hotels to make dramatic changes in the way they serve and physically accommodate guests:

“Interactive computing and multi-media devices will be as commonplace in hotel rooms of the future as present-day remote control televisions and touch-tone telephones. Guests will want the option of avoiding interaction with hotel services and clerical personnel by using these devices. There is no more waiting in line to

check in or out of hotel rooms. No delay while waiting for the hotel operator or some other service clerk to answer the telephone to schedule a wake-up call, take a room service order, or book a restaurant reservation. No need to call for additional towels, or order a shoe shine or dirty laundry pick-up. All of this can be done by touching a few icons on a television screen.”

Many new sources of revenues could result from these changes. Direct guestroom linkups to a wide variety of on-line (e.g., Internet) entertainment and information networks will be a standard requirement in the future. This could mean large access fees for hotels. Rental or usage charges for peripheral devices could also mean big business.

One of the most contentious issues surrounding technology in many companies is amount of capital required. Executives must consider specific program and project funding. A company should have a system that supplies funding for major strategic innovations on a case-by-case basis at any rate that ensures rapid implementation.

Assessing the Value of IT Investment

Haywood (1990) noted, evaluating the value of a continuing investment in technology is difficult, even when implementation has clearly been successful. Senior executives in successful, technology-driven corporations are concluding that assessing the direct return on investment is virtually impossible. However, even though evaluating investment in technology is difficult, some attempt at the evaluation should be conducted. This is simply because of cost-benefit relationships in business and because not all technologies generate positive outputs.

Traditional financial evaluation techniques such as discounted cash flow (DCF) and return on investment (ROI) are not sufficient tools for justifying information technology investments and assessing the business value of complex information systems and applications (Semich, 1994). These techniques stem from a manufacturing environment where the test of a good investment was measured in terms of labor savings, not from improvements in customer service, business processes, and competitive positioning. Yet,

in most organizations, their use is required, despite their apparent shortcomings; all projects must be subjected to some predetermined (by the organization) hurdle rates and rate-of-return. Alternative techniques that should be considered include cost reduction approaches (e.g., cost displacement/cost avoidance, work value analyses, and cost of quality) and strategic approaches that account for technical importance, business objectives, competitive positioning, long-term potential, and option value³. Another technique gaining in popularity is information economic analysis, which combines the importance of non-quantifiable intangible benefits, direct economic costs and benefits, and a risk assessment (Semich, 1994).

One must treat information technology expenditures not as period expenses but rather as capital investments that will add value over the long-term (Applegate, McFarlan, & Mckenney, 1996). Their applications and impact must be considered in a grander context, that of the entire organization. Not all technology investments have easily calculable paybacks or some other economic measures because it is nearly impossible to assess a value to information and knowledge. An emerging theory surrounding the measurement of return on investment from information technology is focusing on intangible benefits (Violino, 1997). This new philosophy suggests that what matters most in terms of return are those things that are the most difficult to measure. According to Professor Erik Brynjolfsson of MIT's Sloan School of Business, to truly assess return on investment, organizations must move beyond the traditional industrial-age thinking based on cost analysis and savings (Violino, 1997). They must look at the economic value added and the benefits to the customers, which are, in most cases, intangible. There is still a place for traditional economic measures of return on investment with respect to technology investment decisions, and these measures should not be overlooked. However, organizations should consider alternative thinking such as the intangibles approach or the "cumulative anecdotal evidence method" (Violino, 1997). The analysis

³ Strategic Consulting Group. *Assessing the value of information technology*, March 1992, Dayton, OH: NCR.

that results and the joint interaction between management, operations, and information technology professionals could prove invaluable to the overall success of the investment initiative.

Summary and Conclusion

The hospitality industry has traditionally been a follower when it comes to the application of IT. However, this is changing; the role of IT is growing throughout the industry as the result of competitive pressures, more affordable and easier-to-use technologies, and guest demands. These trends will yield the most profound effect on the hospitality business and will continue over the course of the future. Today's hotelier cannot ignore these trends. The hotel industry constituted a small slice of the U.S. information technology pie up to 1985. However, the industry increased the technology intensity very sharply during the 1970s through 1985. The 1996 study of Needle (1996) also supports this trend; the hotel industry's spending on information technology is significant.

But, be aware that not all technologies generate positive output or value adding. The technologies implemented in the hotel industry must bring in more guests, reduce labor or other operating costs, or improve guest service levels and customer satisfaction, and therefore bring in more value adding. To do so, one must consider how to develop investment strategies and how to evaluate IT investment. In this study, some investment strategies were discussed with such questions as who, when, where, what, why, and how, and new ways of assessing the value of IT investment were also discussed.

Economic advantages are bestowed on those organizations that can leverage today's information technologies and redefine their business practices (Tapscott, 1996). The patterns of growth, reliability, capability, and dependency on information technology are real. Like it or not, the use of technology will continue to evolve and shape how society

interacts and how products and services are purchased and sold throughout the world. Over time, technology will only become more powerful, capable, and affordable. Therefore, it will become more commonplace and its use will be more acceptable. This leaves hoteliers with few choices. They can either be proactive and position themselves, their companies, and their employees to profit from such innovations, or they can wait, do nothing, and face the consequences-most likely either a game of catch up or a position of technological obsolescence. Because it takes time to build the infrastructure and train staff and guests alike, hoteliers should begin positioning for the future now rather than waiting until it is too late.

References

- Applegate, L.M., McFarlan, F.W., & McKenney, J.L. (1996). *Corporate information systems management: The issues facing senior executives* (4th ed.), Chicago: Irwin.
- de Souza, A.R., & Stutz, F.P.(1994). *The World Economy*. Macmillan College Publishing Co., 427
- Eiteman, D.K., Stnehill, A.I., & Moffett, M.H.(1992). *Multinational Business Finance*, 6th ed.,6.
- Hansen, E.L. & Owen, R.M. (1995, Fall). Evolving technologies to drive competitive advantage in Hospitality Industry”, *Hotel On-line: Ideas and Trends* [On-line}.
- Haywood, M.K. (1990, May). A strategic approach to managing technology. *Cornell HRA Quarterly*, 39-45.
- Leavitt, H.J. (1965). Applied organizational change in industry: Structural, technological, and humanistic approaches”. In James G. March (Ed.), *Handbook of Organizations*, Rand McNally& Company, Chicago, 1144-1170.
- Miller, C.C., Glick, W.H., Wang, Y.D., & Huber, G.P. (1991). Understanding technology-structure relationships: theory development and meta-analytic theory testing. *Academic of Management Journal*, Vol.34(2), 370-399.

- Nardozza, F.J. (1995, Summer). Forces Affecting Change in the Lodging Industry. *The Real Estate Report, KPMG, National Real Estate, Hospitality, and Construction Practice*, 1-2.
- Needle, D. (1996). Betting the store on technology. *InformationWeek*, 192, 194-197.
- Olsen, M.D. (1996). *Into the new millenium: A white paper on the global hospitality industry*. Paris: International Hotel Association.
- Olsen, M.D., Tse, E. C., & West, J. J. (1992). *Strategic Management in the Hospitality Industry*. Van Nostrand Reinhold. 201-207.
- Perrow, C. (1967). A Framework for the Comparative Analysis of Organization. *American Sociological Review*, 32, 194-208.
- Roach, S.S. (1987). America's Technology Dilemma: A Profile of the Information Economy. *Special Economic Study*. Morgan Stanley
- Semich, J.W. (1994). Here's how to quantify IT investment benefits. *Datamation*, 45-46, 48.
- Tapscott, D. (1996). *The digital economy: Promise and peril in the age of networked intelligence*. New York: McGraw-Hill.
- Violino, B. (1997). Measuring value: Return on investment -- The intangible benefits of technology are emerging as the most important of all. *InformationWeek*, 36-38, 40, 44.