TRENDS IN FACILITY MANAGEMENT RESPONSIBILITIES

by

Keum-Jung Lee

Thesis submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

Housing, Interior Design, and Resource Management

APPROVED:

Ruth H. Lytton, Chairman

Michael K. Johnson

Robert A. Parsons

December, 1992

Blacksburg, Virginia

c.2

TRENDS IN FACILITY MANAGEMENT RESPONSIBILITIES

by

Keum-Jung Lee

Committee Chairman: Ruth H. Lytton
Housing, Interior Design and Resource Management

(ABSTRACT)

The purpose of this study was to identify the relationship between the topics addressed in Facilities Design & Management from January 1984 to October 1991 and the responsibilities of facility managers as identified by the International Facility Management Association (IFMA). In addition to the eight IFMA responsibilities, five researcher-developed categories were included. Content analysis of the title and abstract of each feature article (N=413) of the journal was utilized.

Of the 10 primary categories (eight primary categories identified by IFMA and two categories developed from the literature review) which were applied to 273 articles, the responsibility most frequently addressed in the journal was interior planning, followed by responsibilities in interior installation, maintenance and operations, facility management, architecture and engineering services, budgeting, space management, real estate, long-range planning, and facility management in foreign countries. As identified by the analysis of the journal articles, the primary categories of interior planning and interior installation may be considered as the most important tasks of facility management. The category of general facility management knowledge which was not included in the original IFMA list was addressed frequently and may be considered as an evolving responsibility.

Three additional categories of responsibility not included in the original 10 categories were identified in the analysis and applied to 140 articles. These three categories encompassed issues related to organization, office technology, and implementation of facility management. The category most frequently addressed among these three was office

technology.

The findings of this study support several suggestions. Planning and design-related responsibilities were identified as the major tasks of facility management departments. Related concerns included changing furniture needs to accommodate technological changes, increasing attention to employee welfare in the office design, and the increasing effect of office technology on facility management. These same topics reflect needs for continued education among practicing professionals. Similarly, facility management educational programs must develop needed planning and design-related skills as well as a knowledge of real estate and tax law, accounting and financial management, and use of computerized facility planning and building system technologies.

Acknowledgements

The author wishes to express gratitude for the help and guidance given by her advisor, Dr. Ruth H. Lytton. In addition, she wishes to express her thanks to Dr. Michael K. Johnson for his editorial assistance and serving on her committee, and to Mr. Robert A. Parsons for serving on her committee.

She also wishes to express her thanks to Dr. Canestaro for initial suggestion of this thesis and providing the materials for the thesis.

The author is deeply grateful to her husband, Kyoung-Ho, whose continual encouragement and support made this educational endeavor a reality.

Finally, my warmest gratitude and love are given to my daughter, Sowon, for her cheerful smile during the study.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter I

Introduction

What Is Facility Management?

The primary issues faced by an organization include how to deal with process, place, people, and profit, and the eventual integration of the elements. The process is how a job is done, or the job that people are doing. The place is where the process happens or the environment created for the process. The people in the organization should be managed efficiently and communicate easily among their peers, as well as within the chain of command. Finally, profit becomes a measure of how efficiently individuals and groups accomplish the goals of an organization.

The International Facility Management Association (IFMA), founded in 1980, is the only international professional association in the field of facility management. According to their definition, facility management is concerned with the tasks of design, construction, maintenance, and management of the physical environment as it relates to people and work process (IFMA Report #1, 1984). The function of facility management, therefore, is the coordination of the physical workplace with the people and work of the organization. It combines the best management practices with the most current technical and professional knowledge of facility management to create humane and effective work environments with the purpose of increasing the organization's profit, that is, productivity (Sena & Teicholz, 1986).

Therefore, what is important to facility managers is that the design and management of the facilities are intricately tied to the realization of goals of an organization's strategic plan. The facility is a place where the performance of the process through technology, furnishings, architecture, location, and equipment has been specified. These factors are then managed to increase the efficiency and effectiveness of the people who work there.

The factors must also support the processes that occur there. In other words, through people, process, and place, a facility manager should produce a work environment that is not only economically efficient and aesthetically pleasing, but one which integrates all the parts of the strategic design for the organization (Becker & Sims, 1986; Dugas, 1986; OToole, 1986).

In Figure 1, the term people includes the organizational design, tasks, and informal arrangements for employees. Process includes the entire range of office equipment automation and information technology. Place includes individual workstations, furnishings, and layout of offices as well as the entire environment of the office including walls, ceilings, floors, lighting, acoustics, esthetics, and heating (Thomas, 1984).

Managers should understand the interaction among people, process, and place to cope effectively with the increasingly turbulent environmental factors and to achieve the organization's strategic objectives. Therefore, they should understand the changing environmental factors which have an impact on an organization and the facility management.

Various organizations are seeking more effective management of office space. Identification of trends in responsibilities of facilities management may enable managers to respond to changing organizations more effectively as they cope with environmental factors.

Environmental Factors

There are many independent environmental factors which bear on facilities and their management, and the environment is changing continuously. Therefore, to achieve the organization's strategic objectives, facility management and the tasks facility managers must perform are intricately connected to most of these independent environmental factors. Each will be briefly considered.

Economic Conditions. The prolonged economic downturn, beginning in the mid-1970s, resulted by 1984 in the highest rate of job loss since the Great Depression of the

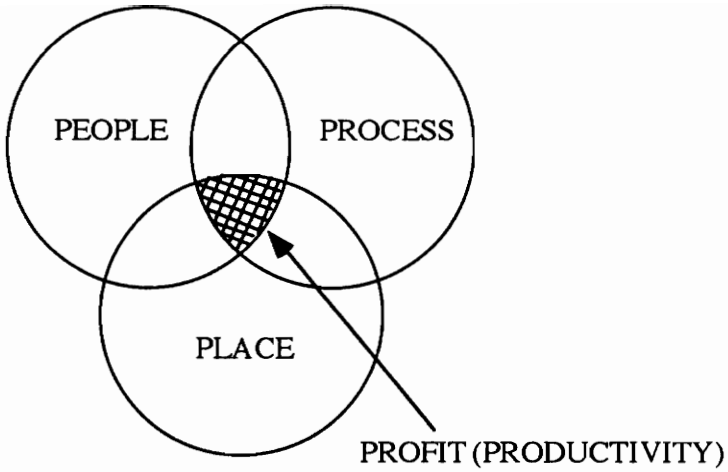

Figure 1. Focus of Facility Management

1930s, and it seems to be continuing. There had been an increase in mergers and acquisitions beginning in the mid-1960s which required the reorganization of corporations, and their people, processes, and physical space. There have also been cycles of inflation and recession during this time period. Each of these economic factors affects business decisions and has resulted in an increased importance for facility management as a contribution to corporate financial success. For example, reorganization requires decisions about new equipment or structural materials during construction, if new construction is needed, and its affect on operational costs. This decision making process is called life cycle costing.

The life cycle cost of equipment is the amount of money required to acquire the equipment, to have it installed, and to operate it for a specified time. The cost of maintenance generally comprises 75% of the total life cycle costs (Shear,1983). Equipment and materials improperly chosen adversely affect cash flow and constitute a continuing hidden loss. However, equipment and materials properly chosen can add to productivity and contribute to profit. Therefore, the role of facility managers within the life-cycle costing process increases in importance due to the cost of maintenance (Brigham & Gapenski, 1991; Greenhalgh & Rosenbaltt, 1984; Shear, 1983; Williams, 1986).

Globalization of Business. There has been a trend toward large, broadly diversified organizations due to industry deregulation and globalization of business. This makes the facilities of organizations more complicated to manage because of diversification compounded by the use of advanced information technologies necessary to be efficient and competitive on a global basis. Planning and forecasting become more important in these larger organizations as a means to control cost and to remain competitive, as well as a way to manage operations and maintenance costs. The need for professional facility management services is apparent in this competitive environment (Sena & Teicholz, 1986).

Energy Conservation. Following the 1973-1974 oil crisis when energy costs

soared, a number of changes occurred in the design and operation of buildings and in ventilation and energy standards. There was an increased need to reduce the operational energy costs of facilities and the emphasis on energy conservation resulted in tighter buildings which have been linked with inadequate building ventilation. These problems became more pronounced following reductions in the ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) ventilation standards for energy conservation in the 1970's. Subsequently, occupants' concern about indoor air quality has also increased. Indoor air quality, health safety, and other indoor environmental concerns have produced economic as well as legal pressures that necessitate improved facility management (Brunner & Bennet, 1977; Hedge, 1990; Sullivan, 1990).

Workforce and Productivity Loss. The rapidly changing industrial structure, from an economy based in manufacturing to an economy of service and high technology industries, has changed the composition of the workforce. The majority of the workforce is now involved in information handling; a task done primarily in the office. This office-based white collar workforce now constitutes more than 50% of all workers (Brill, Margulis, Konar, and Buffalo Organization for Social & Technological Innovation, 1984; United States Department of Labor, 1991). The increased education level required for these jobs results in higher expectations for better work conditions and job satisfaction. While the information-handling workforce has been replacing the other sectors, there has been a long, slow drop in office productivity (Brill, et al., 1984; Cuniff, 1978).

Construction. Offices have been built at a rapid rate to accommodate the growth of the white collar workforce especially during the 1950s and 1960s. Available office space in the U.S. equals about nine billion square feet (Brill, et al., 1984; Sena and Teicholz, 1986). Today, many of those facilities and their component systems are reaching the end of their life cycle. As these facilities age, building system operating costs increase and system reliability decreases. This situation also requires the attention of professional facilities

management (Piper, 1990).

Office Technology. There has been a revolutionary change brought about by the Information Age and it can be seen in the use of office technology at every level of an organization. In addition, hardware costs are falling at a rate of about 30% per year, which will enable smaller firms to use computer technology, such as computer-aided design (CAD) (Teicholz, 1987). The application of automation in facility management includes space needs analysis, space allocation, design and drafting, personnel forecasting, maintenance functions, and asset management. In order to manage increasing volumes of factual information (figures and graphic data) facility managers are increasingly using automated procedures (Teicholz & Sena, 1987).

However, office technology still has not matured. Personal computers have improved very rapidly and it is difficult to predict what the next generation of personal computers will offer. Most experts agree that they will be more powerful with more speed and capacity -- features that will bring more complex programs within the personal computers' capacity. This also gives organizations easier access to computer technology (Jean, 1990).

Rapid office technological changes are constantly occurring. This makes the life cycle of office systems shorter. Systems quickly become obsolete before their life cycle ends and need substantial upgrade. All of this means substantial costs for facilities, and the need for an efficient facility manager who must cope with such states of change.

The Increasing Importance of Facility Management

Corporations have begun to realize that their facilities are a substantial portion of their assets and office buildings are substantial investments. Poor decisions regarding the use of facilities may cost millions of dollars over the life cycle. More importantly, they may prohibit an organization from achieving its basic objectives. Improperly utilized facilities

can limit an organization's flexibility. Facilities managers do not assist in achieving the organization's objective by introducing unnecessarily expensive office technology or by using an office system which does not match the existing systems and so reduces office flexibility. To be effective, facility management requires accurate and continuous information about the changing needs of an organization and changing office technologies.

Facilities have emerged as a concern to senior management because they greatly affect fundamental organizational goals, such as productivity improvement, cost minimization, and corporate image. Senior management has come to realize that facilities can have a substantial effect on organizational and individual performance and productivity, contribute to organizational profit, or constitute a continuing hidden loss (Kirsch, 1985). As a result, there is an increasing need to integrate facility management into corporate strategic planning. Since an organization operates most effectively as an integrated whole, the ability to see things in the full, to see alternatives that do not yet exist, and to see connections between seemingly unrelated parts are required traits for an efficient facility manager.

Justification and Purpose of the Study

Office productivity increases proportionately to the effective integration of the elements - people, place and process - and failure to bring the appropriate balance to any one of the elements may lead to declining productivity. Over the life of a facility, the work environment costs an organization about 15% of all dollars spent (IFMA Report #1, 1984). The work environment has a significant impact on employees' behavior and productivity. This means that each dollar spent on the facility can be a powerful lever because the office environment is a manipulable management tool which can be used to enhance individual and, eventually, organizational effectiveness.

People have been planning, designing, and managing their facilities in the

organizations, and the activities of facilities planning and management have become increasingly professionalized. The need now is to integrate facilities planning and management into corporate strategic planning (Becker & Sims, 1986). With the organizational change, the responsibilities of facility managers have changed and become more important. This study was designed to identify the trends in facility management responsibilities by matching the topical issues, as reported in Facilities Design & Management from 1984 to 1991, with the responsibilities of a facilities manager as outlined by the International Facility Management Association (IFMA). Content analysis of the title and abstract of each feature article (N=413) was utilized.

The Uses of the Study

By comparing the journal articles and the responsibilities outlined by IFMA, several factors can be identified. First, the study will provide information on the practices of those involved in facilities management as represented by the topical articles which appear in the journal. Second, the findings may identify a new evolving responsibility which was not included in the IFMA responsibility list, but was the focus of journal articles. Third, the findings may suggest professional development needs for practicing professionals. As a result, facility managers may be better able to effectively anticipate, prioritize, and plan responses to changing organizational needs. Finally, the study also may provide insight to the areas of study which an educational program in facility management might include.

Theoretical Framework

Today, white collar workers make up the majority of the workforce. Naisbitt (1982), in Megatrends, discussed how the "new breed" of employees is questioning unfair and stress-producing treatment in the office environment. Even though office work, stresses related to it, and the decline in productivity of the office worker have increased in

national importance, United States researchers have ignored the effects of the office environment on productivity and job satisfaction. Workers have higher expectations than their predecessors regarding motivation and job satisfaction from the work environment (Sundstrom, Burt, and Kamp, 1980).

Abraham Maslow's hierarchy of needs theory has given later management theorists much to ponder concerning the behavior of people at work. He arranged man's essential needs into a hierarchical order as shown in Figure 2. According to his theory, when the needs on the lower level have been satisfied, those on the next level will become dominant. And the satisfaction of a need increases the importance of the need rather than reducing it. This suggests that no matter how much management satisfies employees' needs, there will always remain some needs that will never be completely satisfied.

Frederic Herzberg(1959) elaborated on Marslow's need theory in a discussion of hygiene factors and satisfiers at work. He stated that hygiene factors prevent dissatisfaction of employees but do not provide satisfaction, therefore, they are mere maintenance factors. That is, their presence does not provide satisfaction but their absence does result in dissatisfaction. The Maslow hierarchy is divided into higher and lower order needs which correspond to Herzberg's motivation-hygiene factors. The hygiene factors correspond to the first four levels of Maslow's need hierarchy and satisfiers correspond to the self-actualization category.

According to Herzberg, hygiene factors could be seen as company policy, supervision, salary, interpersonal relations, and work environment. The factors related to satisfaction of workers include achievement, recognition, the work itself, responsibility, and advancement. Viewing the work environment as a hygiene factor implies that an organizational facilities strategy could be to provide workers with a minimum work environment which does not create dissatisfaction.

However, Herzberg's theory has been criticized due to it's lack of empirical

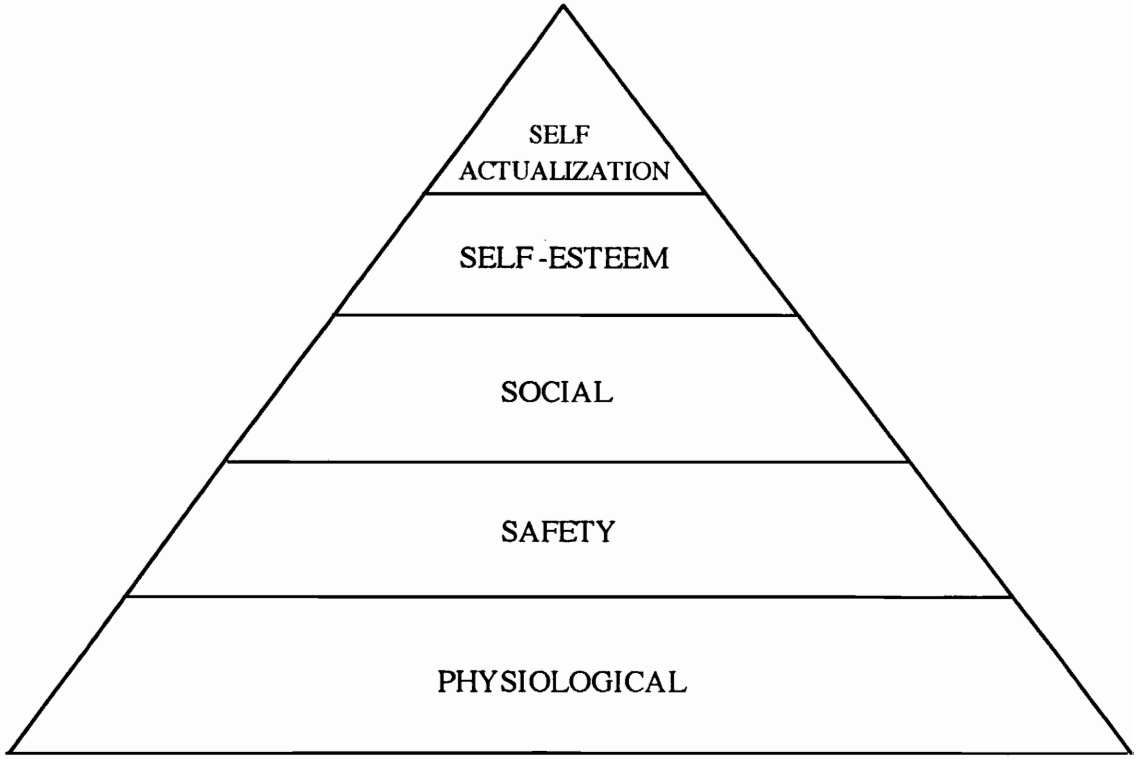

Figure 2. Hierarchy of Needs

support. Other researchers now argue that dissatisfaction and satisfaction, so-called, hygiene factors and motivators can be seen as part of a single continuum (Locke, 1976). Therefore, the work environment can be viewed as a motivator.

A need can be defined as an internal state of disequilibrium, physical as well as psychological, which causes people to pursue an action in an effort to gain equilibrium. Motivation is goal-directed behavior characterized by the process of selecting and directing an action to achieve goals. Motivated behavior is influenced by individual characteristics (needs, interests, attitudes, goals) and organizational conditions (tasks, managerial practice, organizational goals) (Chung, 1977).

The incentive learning theory (Pavlov, 1960) puts the emphasis on external determinants of behavior. Incentive can be defined as a stimuli existing in an organization which can influence the motivated behavior of employees and become a reward when given to employees. Incentives can be substantive (financial, job security, working conditions), interactive (social, work group, leadership, supervision), or expectance (job content, growth opportunity, and responsibility). And, organizational incentives can affect workers' behavior intrinsically or extrinsically. Intrinsic motivation is derived from performing the job. It is internally mediated by individuals and usually associated with higher order needs (self-esteem, self-actualization). Extrinsic motivation is derived from the environment associated with the job. It is externally motivated by something other than the worker and is usually related with the satisfaction of a lower-order need (Sanzotta, 1977). This idea of the incentive learning theory is applied to Chung's model (Chung, 1977) which offers a framework for explaining the motivational process in organizations.

According to Chung's model (Figure 3), motivation can be a result of needs, incentives, and perceptual patterns of an individual. Needs motivate an individual to undertake an action which will result in satisfaction, while external stimuli encourage workers' incentives which lead to the motivated behavior and eventually to productivity. An

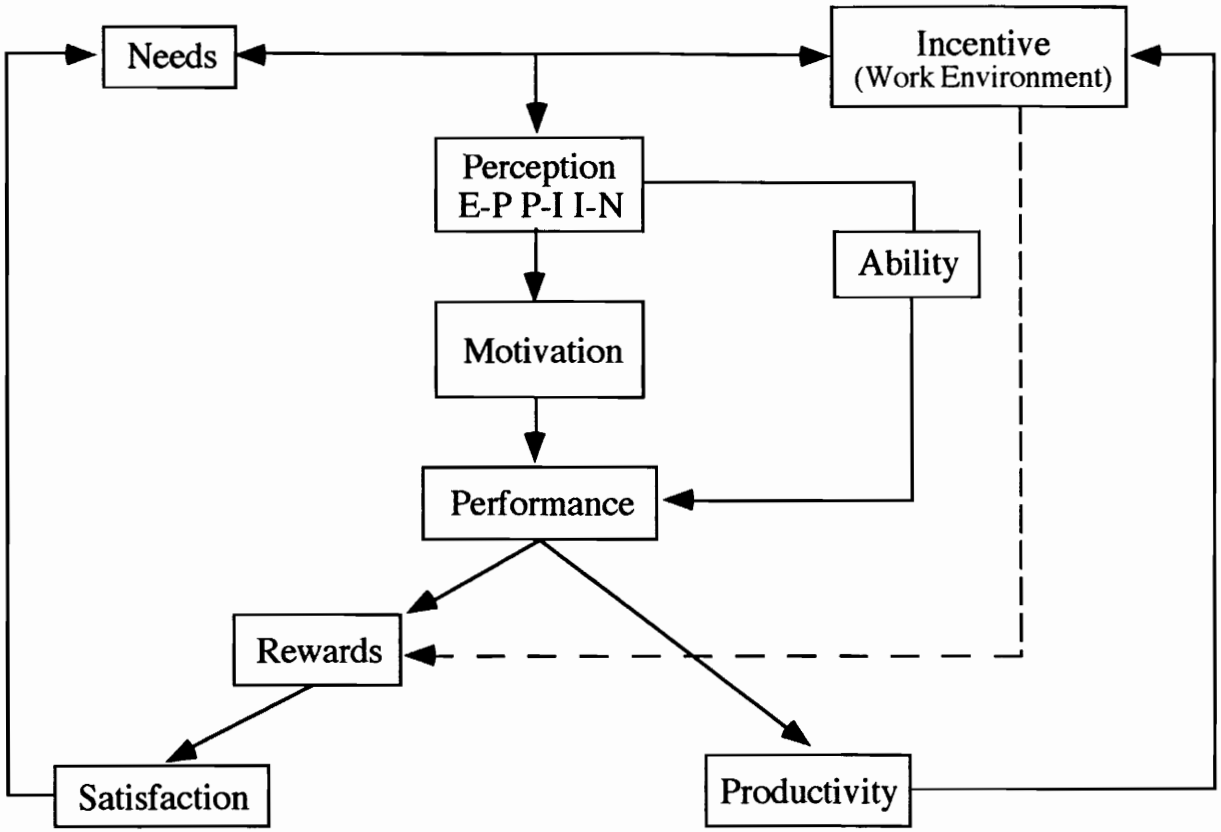

Figure 3. Motivational Process in Organization (Chung, 1977)

individual's perceptual mechanism interprets the expectancy of the effort leading to task performance(E-P), the instrumental relationship between this performance and receipt of incentive rewards(P-I), and the incentive value of these rewards for satisfying needs(I-N) (Vroom, 1964). If an individual perceives the E-P, P-I, and I-N, he will be motivated to act. Ability level also influences perceptions of motivational components. Therefore, if an individual receives an incentive within the perception mechanism and his ability, he will be motivated to act. The amount of rewards and satisfaction achieved modifies the type and intensity of a person's needs, and the modified need structure determines the nature of future behavior. The level of productivity modifies the type and magnitude of incentives used to induce employees to contribute their efforts to attainment of organizational goals (Chung, 1977).

Therefore, when some environment-related needs of employees exist, the needs may be satisfied by providing the incentives of improved work environment which may eventually lead to a change in the motivated employees' behavior. Behavior is an interactive function of both the worker and the work environment. Using workers' performance and satisfaction as outcome indicators, recent research suggests that the physical work environment, or facilities, do impact work (Brill, et al., 1984; Springer, 1986; Sundstrom, Herbert, and Brown, 1982). Furthermore, the work environment has a symbolic impact on workers, that is, the message it gives to workers about what management thinks of them (Canter, 1977; Steele, 1973). These symbolic effects can influence motivation, performance, and satisfaction which lead to productivity as shown in Figure 3. Sociotechnical theory, which was originated by Trist and Bamforth (1951), argued that a production system could be seen neither as a technical system, defined as plant and machinery, nor as a social system, defined as social relations and organization of work, but should be viewed in terms of both of these concepts. From this, it follows that effective performance (morale, output, absenteeism, etc.) is a function of matching the social and the

technical system (Churns, 1976; Pava, 1986).

Therefore, without considering social and technological changes in the environment, enhanced productivity can not be expected. These changes can result in changes of organizational priorities of facilities, and can all contribute to a mismatch between the way facilities are managed and requirements of an organization. For example, as the globalization of business increases, the need exists for advanced information technology to quickly connect the functions of the scattered facilities to support corporate competitiveness. Facility managers can attempt to meet the changing organizational and individual needs within the consideration of social and technological changes. Facility managers need to gather information that can be used to improve benefits of a facility to the organization. This will provide the facility managers an opportunity to find the most appropriate incentive to satisfy the needs, and make facility managers realize that practices and responsibilities of their department need to be adjusted to optimize office space benefits. The improved office environment, as an external incentive, that is, as a need satisfying factor, can be perceived in the same way by individuals, and the result of the incentive would be increased motivation, improved performance and satisfaction, and over time enhanced productivity. (See Figure 4.)

This study was designed to identify the trends in facility management responsibilities that may provide the information to develop appropriate tools, techniques, and standard practices in response to changing organizational needs. These same factors may affect workers' behavior both directly and indirectly.

Delimitations and Limitations

Certain delimitations were established for the study. First, the sample was delimited to only one journal, Facilities Design & Management. However, almost all issues were reviewed since the journal initial publication through 1991. Only issues for 1982-1983 and

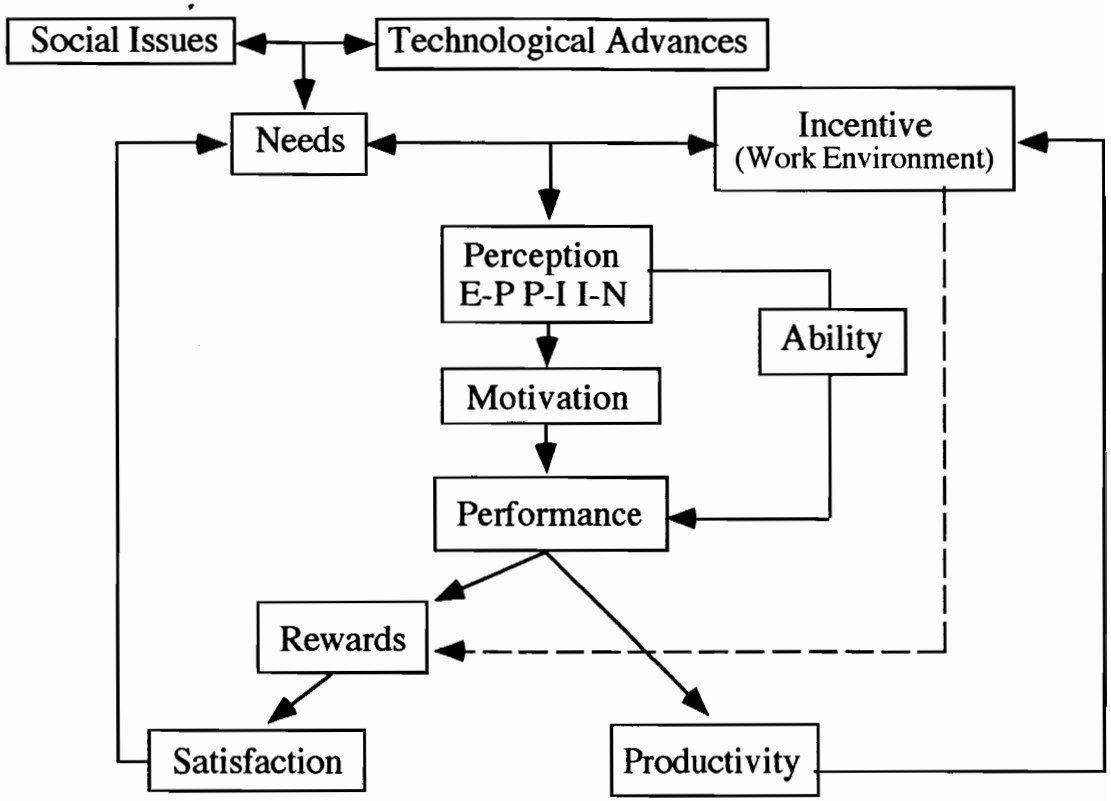

Figure 4. Theoretical Framework

two issues for 1991 were not included in the analysis. Second, the IFMA (International Facilities Management Association) responsibility list was accepted as a categorization scheme for this study. Since it is desirable to use an existing classification system from previous research, and the IFMA responsibility list was based on an analysis of surveys sent to IFMA members and other facilities management professionals (over 800 people) during a three-year period, the categories were thought to be appropriate for the study.

Several limitations of this study were also recognized. Due to time constraints, the material to be studied was coded only by the researcher following the categories and definitions developed by IFMA. And the researcher identified categories were not confirmed by an expert panel. Therefore, inter-coder reliability could not be verified.

The study was also limited to one journal, Facilities Design & Management. Other industry and/or professional publications were not consulted to confirm the validity of the conclusions of this study.

Definition of Terms

The following terms are defined as they were used in the study:

Content Analysis

"A research technique for making replicable and valid inferences from data to their context" (Krippendorff, 1980, p.21).

Facilities Management

An activity which is concerned with the tasks of design, construction, maintenance, and management of the physical environment as it relates to people and work process (IFMA Report #1, 1984).

Organization

A term which encompasses workers, the nature of their work, social systems linking them, and the change they are experiencing.

Chapter II

Review of Literature

Strategic Planning and Facility Management

People have been planning and managing facilities as long as there have been buildings, furnishings, and equipment. More recently, the activities of facility management have become more professionalized in organizations, that is, they have become deliberate and systematically planned. Now the field of facility management is recognized as an important part of strategic planning. To be successful in its mission of supporting the organization, Facilities planning and management must be involved in the organizational planning process from inception through implementation.

Facility management responsibilities include: budgeting, strategic planning and real estate, architectural and engineering services, interior planning and installation, space management, maintenance and operations, and administration (The IFMA Report #1, 1984). Therefore, the scope of facility management could be seen as all the physical aspects of the workplace that support work.

The purpose of strategic planning is to help the organization identify and take advantage of future opportunities that it might encounter and to respond to challenges consistent with the organizational objectives. To make the right choice in the strategic planning, an organization needs to recognize the trends in market and business conditions, workforce, office technology, legal structure and organizational structure, and to understand the implications of these trends for the corporation (Becker & Sims, 1986).

Office Technology and Facility Management

Facilities were typically viewed by corporations as a necessary evil or liability, not as an asset. So facility management was crisis oriented and reactive due to the isolation of

the facility management function from basic corporate planning. Even when fundamental decisions were made that would provide sufficient lead time for facilities planning, the facility managers might not know of the decisions until they were about to be implemented (Becker & Sims, 1986).

Increasing space and energy costs, inflation, rapid technological change, global competition, and a more demanding and changing workforce have made such reactive facility management untenable. No single factor has so dramatically illustrated the failure of reactive facility management as has the rapid changes in office technologies ranging from computer terminals and personal computers to teleconferencing (Peroustians, 1988). These rapid changes in office technology create the need for new equipment and office workers and shorten the life cycle of products. When an organization began to introduce new office technology to satisfy user needs, this new product tended to accentuate the limitations of the existing office technology and seemed to ignore existing facility constraints. In addition, in-house staff often did not have sufficient information and knowledge, or were not properly trained for the new office technology. Consequently, costly professional consultants had to be used.

Upgrading existing facilities to accommodate the new office technology is costly. The new technology may involve new types of work and work processes. New technology has increased the need for proper cable management strategies on the part of facilities management to accommodate equipment relocation. Temperature, humidity, lighting, furniture, and the office layout soon became areas of concern for facilities management (Peroustians, 1988; Shnipper,1985).

Facility management planning can not result in efficient workplace performance without sufficient information about trends of new office technology. Previously, senior management had not fully realized the magnitude of capital investment involved in office facilities. However, corporations are now realizing that their facilities are a substantial

portion of their total assets and also may have a substantial effect on workers' performance and productivity.

Office Environment and Productivity

While there has been rapid replacement of manufacturing by office service work, office productivity has lagged far behind productivity improvements in manufacturing and agriculture since the first oil price shock of 1973. However, the rising costs of acquiring and maintaining facilities, along with concerns for worker productivity, have prompted corporations to take a more integrated approach to ongoing facilities management responsibilities (Brill, et al., 1984; Flaherty, Wise, and Wise, 1990).

To deal with this office productivity lag and the increasing costs of office facilities, innovative management strategies are needed. Most office productivity strategies presently integrate design, automation, and training into a single program. Automation, that is office technology, has had a great impact on office productivity by reducing the time needed to complete work and applying the saved time to another operation. However, without proper training, worker stress from the uncertainty of using rapidly changing office technologies may be increased (Brill, et al., 1984; Zweers, Skov, Valdjorn, and Molhave, 1990).

The emphasis of the management strategies is shifting from simple cost reduction (i.e. performing the same amount of work with fewer employees or less expensive facilities) to the quality and effectiveness of workers' output by providing proper design, equipment, and training (Salustri, 1985). Office automation and design should not be viewed in isolation, but as working in tandem. Effective strategic planning which enables an organization to seize opportunities to increase productivity and avoid traps, should be based on the probability of certain events occurring. To better understand the relationship between productivity and the office environment, it would be helpful to review management theories and significant studies which address the issue of productivity in the office environment.

Sociotechnical Theory

Sociotechnical theory was originated by Trist and Bamforth (1951) shortly after World War II to consider the effects of mechanization in British coal mines. From this theory followed the proposition that effective performance, defined usually in terms of output, absenteeism, and morale, was a function of jointly optimizing the social (social relations and work organization) and the technical systems (plant and machinery). For effective industrial performance, this means that it is necessary to jointly optimize the sociotechnical system, rather than to optimize one (e.g. the technical system), at the expense of the other (e.g. social system). Sociotechnical system design enables organizations to alter themselves in ways that improve the match between the organization and its technology while also maintaining congruence with external demands. The sociotechnical system design includes the process of social analysis, technology analysis, and development of design options to achieve social system adaptation to technological change. Integral to this are efforts to achieve intensification of labor, or changes that will facilitate increased employee workloads and faster paced working conditions. Therefore, sociotechnical system design holds great potential as a powerful vehicle for organizational change (Churns, 1976; Pava, 1986).

Studies Related to the Workplace

The BOSTI (Buffalo Organization for Social & Technological Innovation) study (1984) was the broadest, longest-lived (four years and on-going), environmental design research program ever conducted in the United States. It was designed to quantify the impact of the office environment on job satisfaction and performance through a survey of 10,000 office workers and managers in about 50 public and private sector offices across the country. The purpose of this study was to prove that the design of the office can improve

productivity and the quality of work life, to quantify the dollar value of improvements of individual facets of the office environment that influence job satisfaction and job performance, and to support the search for cost-effective solutions in the design and management of the office environment.

The BOSTI study looked at the workplace as a collection of 18 facets as shown in Figure 5. The research, a pre- and post-study, explored how changes in these facets related to changes on four measures which have economic implications for organizations, job performance, job satisfaction, ease and quality of communication, and satisfaction with the office's physical environment. These are called bottom-line measures by BOSTI because they include job satisfaction and job performance, both of which have measurable economic consequences to organizations. In job satisfaction, the dollar value of changes was computed as lower costs resulting from lower turnover and less absenteeism. Job performance was measured as reduced personnel costs due to more efficient job performance. As a result of the study, the potential cost savings associated with effectively designed office environments could be measured (Brill, et al., 1984)

The BOSTI study revealed four findings. First, the more satisfied people are with the environment they work in, the more satisfied they are with their job and the better their job performance. Second, job performance and job satisfaction are bottom-line measures. Nine individual issues affected job satisfaction and four issues affected job performance as shown in Figure 5. Third, each relocation of a worker and work space means a loss of money and time for each worker. Fourth, workers who participate in the planning and design process of their own workspaces are the most satisfied with their work environment and their jobs.

Tapscott (1982) conducted research which considered the office of the future and the relationship between office automation and white collar productivity. This study was designed to measure how new technologies can improve the effectiveness of office work

Showing the 18 facets which comprise office space, with a bar (▬) indicating which facets related to bottom-line measures

	BOTTOM-LINE MEASURES			
FACETS	**ENV.[a] SAT.**	**EASE[b] COMM.**	**JOB.[c] SAT.**	**JOB[d] PERF.**
ENCLOSURE	▬	▬		▬
LAYOUT	▬	▬		▬
FURNITURE	▬	▬	▬	
NOISE	▬	▬	▬	
FLEXIBILITY	▬	▬	▬	
PARTICIPATION	▬		▬	
COMPORT	▬		▬	
COMMUNICATION	▬	IS THE SAME	▬	
LIGHTING	▬		▬	POSSIBLY
TEMP./AIR QUALITY	▬		▬	
FLOOR AREA		▬	▬	
PRIVACY	▬	▬		
STATUS	▬	▬		
PATHFINDING	▬	▬		
DISPLAY	▬			
APPEARANCE	▬			
OCCUPANCY		▬		POSSIBLY
WINDOWS	POSSIBLY	POSSIBLY		

[a]Environmental Satisfaction [b]Ease Communication [c]Job Satisfaction [d]Job Performance

Figure 5. Facets and Bottom-Line Measures (Brill et al, 1984)

performance, to determine what the new systems can achieve, and to develop new systems which are potentially adaptable to any environment and needs. The study was also concerned with the workers' attitudes regarding the use of the newly introduced automated system, time use, and communication patterns. The general finding of the study was that the automated system improved workers' time use, communication, attitudes toward office technology, and quality of work life. In other words, an office with appropriate systems technology can improve the workers' productivity.

Springer's study (1982) of a major insurance company examined the impact of ergonomic furniture on the performance and productivity of VDT (video display terminal) users. Done in a simulation laboratory which recreated all work conditions, the study found that the best ergonomic furniture contributed a 10 to 15% improvement over normal conditions with 5% of this difference attributable to improved seating. Another study by Springer (1986) examined how changes in furniture and equipment affect individual or group performance. Each of Springer's studies demonstrated the positive effects of the office environment on performance. The Corps of Engineers CERL(Construction Engineering Research Laboratory) study also proved that enhanced workstations and the use of system furniture enhanced worker performance and also proved system furniture's space saving benefits (Frances, 1986).

Summary

Under the conditions of rapidly changing technologies and changing office systems, the strategic planning of facility management becomes more important and more difficult. Strategic planning and forecasting are continuous processes in which the action plan defines how to reach decisions. Corporate managers should identify information useful for effective decision-making. Organizations cannot predict the future, but management can try to monitor the past and present to identify trends that may be useful in determining where

the organization wants to be in the future.

Because the proactive facility managers' actions are so much related to the workers' performance and satisfaction (i.e. productivity), the identification of trends in facility management responsibilities may help the process of strategic planning. In fact, it is the action of proactive facilities managers which help prepare an organization for coming social and technological changes. In this study, content analysis will be used as a methodological tool to identify trends in facility management responsibilities through the relevant facility management literature.

Chapter III

Methodology

Content analysis is a research technique for quantifying verbal and nonverbal communication and involves a process of identifying, coding, and categorizing the primary patterns of data. It is especially applicable to research areas in which the sources are numerous and unstructured. The quantification and systematization inherent in the method are the key elements that distinguish content analysis from subjective and interpretive approaches to documentary research (Holsti, 1969).

The purpose of this study was to identify historical trends in facility management responsibility as represented by a journal, Facilities Design & Management, in an effort to produce descriptive information about these trends. Identification of informational trends as provided through the journal may serve to help facility managers cope more proactively with changing organizational needs. Content analysis was selected as a methodological tool for reviewing the feature articles of this journal from January 1984 through October 1991.

Content Analysis

Content analysis is a technique of studying and analyzing verbal and non-verbal communications in a systematic, objective, and quantitative manner to measure variables. The researchable material of the content analysis technique may be any form of communication, although it is usually written materials. It is especially applicable to research areas in which the sources are numerous, the records unstructured, and implicit meanings are sought. Content analysis is more than a method of analysis, it is a method of observation (Holsti, 1969).

Content analysis can be used for many purposes. A few examples are listed (Berelson, 1952):

- to disclose international differences in communication;

- to compare " levels " of communication;
- to audit communication content against objectives;
- to code open-ended questions in surveys;
- to reflect cultural patterns of groups, institutional, or societal attention; and
- to describe trends in communication content.

Among these uses, the generation of cultural indicators that point to the state of beliefs, values, or other culture systems may be considered as the most important use of content analysis (Klingmann, Mohler, and Weber, 1982; Namenwirth and Lasswell, 1970; Rosengreen, 1981; Weber, 1984).

When content analysis is compared with the other similar analytic techniques, it has several advantages. First, content analysis works directly on the text of human communications which is a central aspect of social interaction. Second, content analysis methodology combines what are usually thought to be antithetical modes of analysis by utilizing both qualitative and quantitative operations on texts. Third, instead of observing people's behavior directly, or interviewing them, the investigator using content analysis utilizes unobtrusive measures in which neither the sender nor the receiver of the message is aware that they are being analyzed. Culture indicators generated from documents of various kinds which exist over long periods of time constitute reliable data; these culture indicators can be used to assess quantitatively the relationships among social, economic, political, and cultural change (Namenwirth and Lasswell, 1970; Webb, Cambell, Schwartz,and Sechrist, 1966; Weber, 1984). Finally, one of the most important advantages of content analysis is its general applicability. Content analysis has been used to determine the relative emphasis or frequency of various communication phenomena: trends, styles, and changes in content.

An important aspect of content analysis is that many words of the text are classified into much fewer content categories, which may consist of one or many words. Depending

upon the purposes of the researcher, the units of text classified in the same category can be based on the precise meaning of the words, such as synonyms, or can be based on words or groups of words with similar connotations (Weber, 1984).

However, the process of content categorization creates the problem of data reduction by which the many words of texts are classified into much fewer content categories. There is also a problem of reliability due to the ambiguity of category definitions or other coding rules. These problems can be solved by involving multiple coders in the classification process which permits the quantitative assessment of achieved reliability.

Sources of Data

Anything connected with the theme that interests a researcher may be seen as data for content analysis (Krippendorff, 1980). The objective of this study was to identify trends in facility management responsibility as published in the press and to match them with the responsibilities of a facility manager as outlined by IFMA. A contemporary magazine, Facilities Design & Management, was used as the primary source for data collection. This journal was selected because it is the oldest and most popular trade magazine in the field. It is edited by IFMA members, and reports recent practical information related to facilities management.

Sample

Content analysis considers the specific content pertinent to the research problem studied. Documents such as popular magazines have a vast amount of information. The Facilities Design & Management journal also contains much information related to the field, facilities management.

The sample for the study included all the feature articles of each magazine published between January 1984 and October 1991. A few earlier editions of Facilities Design &

Management had been published, but were not available for inclusion in the sample. The feature articles were chosen because they deal with the most important and recent issues of facility management. The functions of facilities management support the coordination of the physical workplace with the people and work of the organization. Since facilities management has diverse functions and serves to transform the various parts into a whole, facilities managers need broad knowledge of the elements related to their functions. The selection of a sample of feature articles dealing with specific issues may have produced a biased sample. Consequently all 413 feature articles were included in the analysis.

Instrument Categories

After the proper sampling data are chosen, the classification system needs to be developed for analyzing the content. There are three methods for determining the classification system. First, it is desirable to use an existing classification system from the previous research, when it is possible. Second, a researcher can use the available content analysis dictionaries or standard coding categories. Finally, a classification system can be developed by the researcher if a content analysis dictionary or classification system that fits the research objective is not available.

For this study, to derive the major categories of measurement, the International Facility Management Association (IFMA) Report #1 (1984) was reviewed. The report provides a functional definition of facilities management. The 8 main areas and 39 sub-areas of responsibility for facilities management are outlined by IFMA. (See appendix A.)

This responsibility framework was used as the primary and secondary categories of measurement for this study. The International Facility Management Association, the largest professional society in the field of facilities management, conducted a three-year research project to generate the functional definition and responsibilities outline. The information included in the IFMA #1 report is based on an analysis of surveys sent to IFMA members

and other facilities management professionals (over 800 people) during the three-year period. Therefore, the categories were thought to be appropriate enough to be used throughout all the years to be studied. However, after further examination of the materials to be analyzed, new categories including two from the literature review and three resulting from the analysis process were added to the categorization scheme for the observations that were not easily classified using the operational definitions.

Quantification

The context unit of the study was the title and abstract of all feature articles of the Facilities Design & Management journal between January 1984 and October 1991. For this study, the coder read the title and abstract of each feature article, and matched the key issues presented with the most appropriate primary and secondary categories following the definition of each category as outlined by IFMA. If more detailed information was required, an additional category was developed for the purpose of clearly categorizing the article. The process of content analysis utilized the frequencies of primary and secondary categories to identify the major trends in facilities management responsibility. The data were coded, verified, and analyzed using the Statistical Analysis System (SAS) (Helwig, 1978).

In SAS, data values are letters or numbers on punched cards or computer disk or tape. Each variable should be given a variable name that will be used in describing the variable to SAS (Helwig, 1978). In this study, each variable was named as an article with primary, secondary, and/or additional coding categories. Data values of article coding classifications, and primary and secondary coding classifications were entered as numbers onto computer disk. In the article column, the numbers represented the year, volume, and number of the magazine, and the page number of the article in the magazine. The primary and secondary coding categories were numbered following the order of the responsibility list, and the numbers were coded as data values in the primary and secondary columns. The

additional coding categories were developed and numbered. Data values of the additional coding classification also were entered as numbers onto the computer disk.

Issues of Reliability and Validity

Although content analysis is designed to be objective, many of the procedural steps in content analysis involve subjective decisions on the part of the researcher. For this reason, one of the difficulties with the method is ensuring reliability.

In this study, the responsibility list outlined by IFMA was used as the major coding categories and the definitions of the categories were also provided by IFMA. By following the categories and definitions, the problems of reliability due to the ambiguity of category definitions and classification process were solved. These categories and definitions were used in the actual coding of the observations as a pretest process to verify the validity of the coding classification scheme. Reviewing the overall results of the pretest ensured that the coding scheme was appropriate to this study because all the primary categories and most of the secondary categories were utilized.

Chapter IV

Findings and Discussion

Historical trends in facility management responsibilities were identified in this study. Using content analysis methodology, the coder reviewed the title and abstract of each feature article of the Facilities Design & Management journal published between January 1984 and October 1991, and matched the key issues presented with the instrument categories developed for this study.

In this chapter, the sample is described by discussing the findings for the primary and secondary categories identified by IFMA, as well as the researcher developed categories. Descriptive statistics and a discussion of findings will be presented for each category. The identified trends are then addressed individually.

Description of Sample

A total of 413 feature articles of Facilities Design & Management were included in the sample. The number of articles from each year varied. (See Table 1.) Each article was coded by identifying and matching the key issues presented with the most appropriate 8 primary and 39 secondary categories of responsibility as defined by IFMA. However, some articles dealt with issues of general facility management skill and facility management issues in foreign countries that were not included in the primary categories outlined by IFMA. According to the literature review, there is increasing awareness of facility management as an independent profession and as an important function in an organization. Additionally, there is a tendency toward globalization of business. Therefore, two primary categories, general facility management skill and facility management issues in foreign countries, were added to the IFMA responsibility list. General facility management skill encompassed the wide range of skills and procedures necessary to make effective use of the

TABLE 1
Frequency of Journal Issues (N=80) and Articles (N=413) by Year, 1984-1991

Year	Issues	Percent	Articles	Percent
1984	9	11.25	57	13.8
1985	9	11.25	47	11.4
1986	10	12.50	51	12.3
1987	10	12.50	58	14.0
1988	10	12.50	49	11.9
1989	10	12.50	50	12.1
1990	12	15.00	54	13.1
1991	10	12.50	47	11.4

office environment and to meet organizational objectives. The category of foreign countries covered the issue of facility management in foreign countries.

Among the total of 413 articles, 273 articles were categorized on the basis of the 10 primary categories which were composed of 8 IFMA responsibilities and 2 categories developed by the researcher. Of these, 224 articles were categorized on the basis of the 39 secondary categories of responsibilities; 49 articles dealt only with the general information related to the primary categories.

Three additional categories were developed for those articles which dealt with specific issues that were not easily classified using the operational definitions. The 12 sub-categories were developed to provide a more descriptive classification scheme. These categories were divided into three groups: organization related issues, office technology related issues, and implementation of facility management issues. (See Figure 6.) This classification scheme was applied to 140 of the 413 articles.

Description of Responsibilities

Primary categories: A statistical description of the 10 primary categories is shown in Table 2. Of the 10 primary categories, most articles were written on the topics of interior planning (23.81%), interior installation (13.92%), maintenance and operations (13.55%), and general facility management skill (11.72%). The latter category was developed by the researcher and was not included in the original IFMA responsibility list.

In contrast, the four categories with the least coverage among the 273 articles included the topics of facility management issues in foreign countries (1.47%), long-range planning (2.20%), space management (6.23%), and real estate (8.06%). Facility management issues in foreign countries was the other primary category developed by the researcher. The limited attention to this topic supports its exclusion from the IFMA

1. Organization Related Issues

Organization encompasses employees, the nature of their work, and the work environment.

-Space/Furniture Standard: Company-wide standards to regularize office esthetics and save money

-Centralization: Centralized facility management operations that embraces all subsidiaries

-Internationalization: The internationalization of facilities and facility management functions of an organization

-Environment: Ecological and environmental awareness of facility management

2. Office Technology Related Issues

Office technology comprises the use of computers, microelectronics, telecommunication, and related areas.

-Information Technology: The use of computers, microelectronics and telecommunications to help produce, store, obtain, and send information in the form of images, words, or numbers.

-Wire Management: Management of fiber optic and twisted pair cables that connect equipment

-Systems Furniture: Mobile and flexible furniture to accommodate future growth and ever-changing high-tech systems

-Building Automation System (BAS): Which covers energy management, security, and fire protection functions

-Computer Aided Design (CAD) / Computer Aided Facility Management (CAFM)

-Computer Integrated Facility Management (CIFM)

3. Implementation of Facility Management

-In-House: In-house facility executives have responsibilities for all of office and real-estate decisions

-Consultant: Contracting out for the facility management functions

Figure 6. Definition of Three Categories Not Identified by IFMA

Table 2
Frequencies and Percentages of Articles by Primary Categories for each Year

	Year																Total	
	84(9)[1]		85(9)		86(10)		87(10)		88(10)		89(10)		90(12)		91(10)			
	F[2]	P[3]	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P
Facility Management	2	0.73	5	1.83	3	1.10	3	1.10	5	1.83	3	1.10	2	0.73	9	3.30	32	11.72
Foreign Countries	2	0.73	1	0.37	0	0.00	0	0.00	0	0.00	0	0.00	1	0.37	0	0.00	4	1.47
Real Estate	2	0.73	3	1.10	3	1.10	5	1.83	3	1.10	2	0.73	3	1.10	1	0.37	22	8.06
Long-Range Planning	1	0.37	0	0.00	2	0.73	0	0.00	1	0.37	0	0.00	1	0.37	1	0.37	6	2.20
Space Management	4	1.47	1	0.37	2	0.73	1	0.37	1	0.37	2	0.73	4	1.47	2	0.73	17	6.23
Interior Planning	8	2.93	3	1.10	6	2.20	11	4.03	10	3.66	9	3.30	8	2.93	10	3.66	65	23.81
Interior Installation	5	1.83	8	2.93	3	1.10	3	1.10	6	2.20	7	2.56	6	2.20	0	0.00	38	13.92
Architecture and Engineering Services	1	0.37	4	1.47	3	1.10	4	1.47	3	1.10	2	0.73	7	2.56	4	1.47	28	10.26
Maintenance and Operations	4	1.47	7	2.56	6	2.20	7	2.56	3	1.10	4	1.47	3	1.10	3	1.10	37	13.55
Budgeting	5	1.83	2	0.73	2	0.73	3	1.10	4	1.47	3	1.10	0	0.00	4	1.47	24	8.79
																	273	100

[1]Number of Issues
[2]Frequency
[3]Percentages: [No. of articles (F) on each topic for each year/Total no. of articles (N=273)] x 100

responsibility list.

The graph in Figure 7 shows how the frequency of articles in each primary category changed over the time period. Data related to each category shown in Table 2, and the related trend data shown in Figure 7 will be discussed individually per the list of categories in Table 2.

Secondary categories: Each of the eight primary categories of responsibilities identified by IFMA included a secondary list of descriptions. Several secondary categories which were considered important or which depict a specific trend will be described and discussed as they relate to the primary categories.

1. Facility management: Of the 273 feature articles in Facilities Design & Management, 32 articles (11.72%) dealt with the broad category of general facility management skill. (See Table 2.) As shown in Figure 7, there was a sharp increase in the number of articles on this topic in 1991, more than four times that of the previous year. This may indicate that general facility management skills and procedures, that is how the composition and operation of the facility management department in an organization, necessary for the organization's efficient use of facilities in response to changing demands may become as important as the design of facilities and the work environment itself. Therefore, the facility manager's role becomes more important as business planning becomes more responsive to complex and volatile conditions. No secondary categories were developed by the researcher for this topic.

2. Facility management in foreign countries: Four articles (1.47%) dealt with the issue of facility management issue in foreign countries. (See Table 2.) According to the data in Table 2, the issue of facility management in foreign countries has not been a primary concern for the facility management profession in the U.S. The trend line, shown in Figure 7, was consistently flat with the largest number of articles (2) appearing in 1984. However, its inclusion did facilitate a more complete categorization of articles for the purpose of this

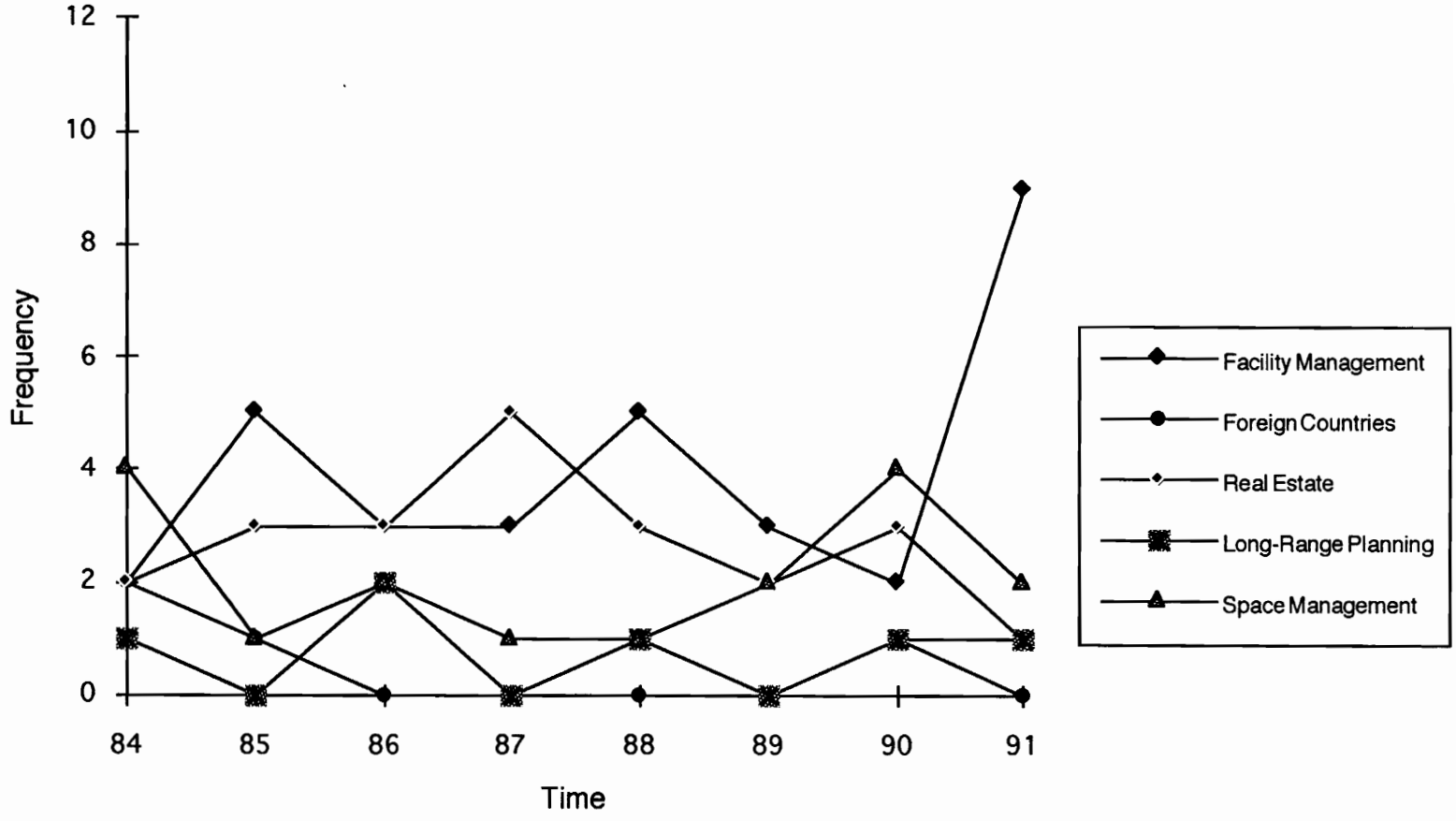

Figure 7. Graph of Article Frequency by Primary Category and Year

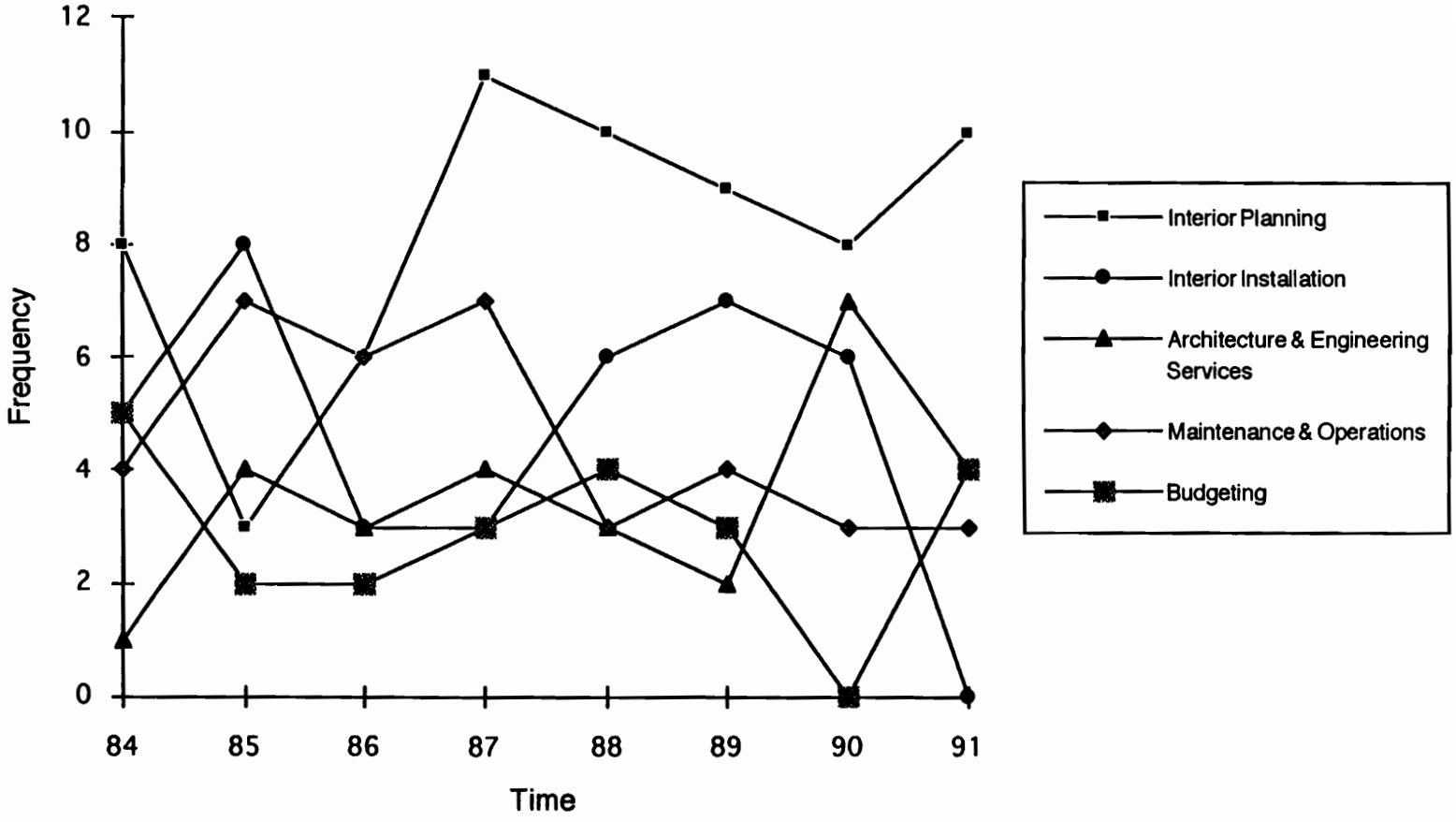

Figure 7. Cont'd

study. No secondary categories were developed by the researcher for this topic.

3. Real estate: As shown in Table 2 and Figure 7, there was increased concern for the topic of real estate in 1987. During the review period (1984 - 1991), 22 of the 273 articles (8.06%) addressed real estate topics.

Each article was coded using a secondary category, as shown in Table 3. Based on the data, the most noticeable responsibility in this area is property disposal. Articles on this topic represented 50% of the articles on real estate, but only 4% of the total 273 articles. Topics considered here related to land, buildings, and leaseholds of an organization, and may reflect the organization's concern for the diminishing tax benefits of real estate ownership and difficult economic conditions. Property disposal seems to be an important facility management function for successful real estate investment.

4. Long-range planning: The data in Table 2 show very few articles related to long-range planning for facility management. Of the 273 articles, only 6, or 2.20% dealt with this issue. As shown in Figure 7, this category had the least coverage of any topic included in the IFMA responsibility list in this study. Due to the changing environmental factors, organizations have been changing their structures and objectives, and it seems natural to increasingly engage in proactive business planning. Therefore, the limited attention to this topic does not mean that organizations are doing less long-range planning. Rather, it may indicate that facility management departments have not been consistently included in the strategic planning process to support the business changes, and so remain in the reactive management function.

When the secondary categories were considered, the data in Table 4 show no articles on one-to-three year planning or ten-plus year planning. Most articles dealing with this issue discussed long-range planning in general, 4 or 66.67% of the 6 topical articles; this represented only 0.73% of the total 273 articles. Only 2 articles specifically described three-to-ten year planning in facility management.

Table 3
Frequencies and Percentages of Articles by Secondary Categories for Real Estate Category

Categories	Frequency	Percentage[1]	Percentage[2]
Building acquisition-purchase	1	4.55	0.37
Building acquisition-lease	2	9.09	0.73
Site selection	2	9.09	0.73
Site acquisition	1	4.55	0.37
Property disposal	11	50.00	4.03
Out leasing	0	0.00	0.00
General[3]	5	22.73	1.83
Total	22	100.00	8.06

Table 4
Frequencies and Percentages of Articles by Secondary Categories for Long-Range Planning Category

Categories	Frequency	Percentage[4]	Percentage[5]
1-3 years long range plan	0	0.00	0.00
3-10 years long-range plan	2	33.33	0.73
10^{+} years long-rang plan	0	0.00	0.00
General[6]	4	66.67	1.47
Total	6	100.00	2.20

[1]% on the basis of frequency by category, N=22
[2]% on basis of total, N=273
[3]General information related to primary category of Real Estate (not included in secondary categories)
[4]% on the basis of frequency by category, N=6
[5]% on the basis of total, N=273
[6]General information related to long Range Planning (not include in secondary categories)

5. Space management: According to the data in Table 2, 17 articles or 6.23% of the 273 articles dealt with the topic of space management. The category of space management demonstrated no significant change of frequencies over the period examined. (See Figure 7.)

When the secondary categories were considered, the data in Table 5 show that over half (N=11 or 64.71%) of the articles related to space management, and 4% of the total 273 articles, focused on space allocation. According to the IFMA Report #2 (1986), organizations managed a combination of owned and leased office space with a typical ratio of 80% owned and 20% leased. Tax reform caused widespread changes. For example, due to the Tax Reform Act in 1986, tax benefits of real estate ownership were greatly diminished, rents were expected to rise, and/or property values to decline, to keep returns on real estate competitive with other investments (Grey & Kania, 1986). This factor effects decisions about renting or owning space to efficiently control the cost for office space. Therefore, this may reflect the concern for the rising cost of space and the increasing importance of effective use of office space.

6. Interior planning: As shown in Table 2, articles considering the responsibility of interior planning appeared most frequently, 65 articles or 23.81% of the total. The trend line in Figure 7 shows that this category had the most consistent coverage over the review period. This suggests that this task has been the most common responsibility of the facility management department.

The category of interior planning (N=65) included four secondary categories which are planning, replanning, furniture specification, and major change. (See Table 6.) Of them, 23 articles addressed furniture specification and provided specific information on new furniture, furnishings, or equipment which represented 35.38% of the 65 topical articles and 8.42% of the total 273 articles. Receiving recent information on new furniture or equipment may be a major concern among facility managers as they attempt to stay abreast of changing

Table 5
Frequencies and Percentages of Articles by Secondary Categories for Space Management

Categories	Frequency	Percentage[1]	Percentage[2]
Space allocation	11	64.71	4.03
Space inventory	3	17.65	1.10
Space forecasting	3	17.65	1.10
Total	17	100.00	6.23

Table 6
Frequencies and Percentages of Articles by Secondary Categories for Interior Planning

Categories	Frequency	Percentage[3]	Percentage[4]
Planning	9	13.85	3.30
Replanning	14	21.54	5.13
Furniture specification	23	35.38	8.42
Major change	19	29.23	6.96
Total	65	100.00	23.81

[1] % on the basis of frequency by category, N=17
[2] % on the basis of total, N=273
[3]% on the basis of frequency by category, N=65
[4]% on the basis of total, N=273

office technology and meet the changing demands of their organization. Thus the information may help organizations to more efficiently make decisions about purchases in response to changes. This shows that, as the environment changes, especially as information and computer technology changes, organizational structure and related demand for furniture, furnishings, and equipment also changes. The changes are so rapid that facility managers need continuous information to accommodate the changes and to be effective. Therefore, the frequent articles addressing furniture specification provided necessary information. The frequency of articles related to the secondary categories of replanning (N=14) which represented 21.54% of the topical and 5.13% of the total 273 articles, and major changes (N=19) which represented 29.23% of topical and 6.96% of the total 273 articles, also reflect the organizational need to accommodate environmental changes.

7. Interior installation: The topic of interior installation appeared frequently, 38 articles or 13.92% of the total, as shown in Table 2. Articles addressing this responsibility have appeared second in frequency during most of the review period. (See Figure 7.) Therefore, issues related to interior installation are the second most common concern among facilities managers as represented by the number of published journal articles. Within this category the topic of employee satisfaction evaluation (N=12) which represented 31.58% of the topical and 4.39% of the total articles, design evaluation (N=9) which represented 23.68% of the topical and 3.30% of the total articles, and furniture installation (N=7) which represented 18.42% of the topical and 2.56% of the total articles, appeared most frequently. (See Table 7.)

The availability of information on employee satisfaction suggests that organizations recognize that people costs are a major part of their operating cost and that employee performance is affected by the work environment. The frequency of articles on design evaluation (N=9) also suggests that the design of the work environment has an effect on

Table 7
Frequencies and Percentages of Articles by Secondary Categories for Interior Installation

Categories	Frequency	Percentage[1]	Percentage[2]
Furniture installation	7	18.42	2.56
Furniture moving	2	5.26	0.73
Furniture maintenance	3	7.87	1.10
Furniture inventory	1	2.63	0.37
Minor changes	4	10.53	1.47
Design evaluation	9	23.68	3.30
Employee satisfaction evaluation	12	31.58	4.39
Total	38	100.00	13.92

Table 8
Frequencies and Percentage of Articles by Secondary Categories for Architecture and Engineering Services

Categories	Frequency	Percentage[3]	Percentage[4]
Architectural design	6	21.43	2.20
Systems design/Building programming	3	10.71	1.10
Code compliance	2	7.14	0.73
Construction management	17	60.71	6.23
Total	28	100.00	10.26

[1]% on the basis of frequency by category, N=38
[2]% on the basis of total, N=273
[3]% on the basis of frequency by category, N=28
[4]% on the basis of total, N=273

employee performance, therefore, post-occupancy design evaluation is required. The frequency of articles on furniture installation (N=7) suggests the importance of facility flexibility to enable organizations to efficiently cope with future changes.

The interest expressed regarding interior installation in the Journal of Facilities Design & Management is consistent with IFMA's identification of this category as a major responsibility of facility managers. Within this category, issues related to employee satisfaction and design evaluation received the most attention. The implication is that additional professional development in these areas is indicated. Further, interior installation and its related responsibilities, must be a primary focus of any facilities management curriculum.

8. Architecture and engineering services: Issues related to architecture and engineering services were covered in 28 or 10.26% of the total 273 articles. (See Table 2.) This category included the four secondary categories of architectural design (N=6 or 21.43%), systems design and building programming (N=3 or 10.71%), code compliance (N=2 or 7.14%), and construction management (N=17 or 60.71%). (See Table 8.)

According to the data shown in Table 8, articles related to administration and management of new construction (N=17), which represented 60.71% of the topical and 6.23% of the total articles, appeared almost three times as often as articles on architectural design of acquisitions and improvements (N=6). This means that, even though there has been a domestic construction slump (Special Report, 1990), articles related to new construction and installation have sustained interest.

9. Maintenance and operations: From the data of Table 2, 37 articles or 13.55% of the total 273 articles dealt with the responsibility of maintenance and operations. The articles dealing with the category of maintenance and operations appeared frequently during 1985-1987, then dropped off. (See Figure 7.) This change may be explained in relation to national attention on energy management. This primary category was subdivided into nine

secondary categories.

According to the data in Table 9, the articles related to the issue of energy management (N=13 or 35.14% of the topical articles) appeared most frequently, followed by 9 articles (24.32% of the topical articles) related to maintenance of finishes. Information related to landscape maintenance, trash removal, and hazardous waste disposal was apparently not of sufficient concern among professionals to warrant articles.

10. Budgeting: According to the data in Table 2, 24 articles or 8.79% of the total dealt with the topic of budgeting. Trend data for articles related to budgeting responsibilities also appear in Figure 7. As shown, there was a significant reduction in the frequency of articles appearing in 1990. However, the data do not suggest any reason for the reduction. In fact, the articles that appear do not suggest that the responsibility for budgeting has been reduced within the facility management department. The primary category of budgeting included the sub-topics of capital budgeting, budgeting for operations, and budgeting for furniture.

One of the most difficult problems a facility manager faces is budgeting for capital expenditures. Capital budgeting is the procedure that justifies the expenditure by proving the benefits (Dimkoff, 1985). Among the secondary categories related to budgeting responsibility, the issue of capital budgeting (N=11), which represented 45.83% of the topical and 4.03% of the total articles, appeared most frequently. (See Table 10.) As indicated by this data, it may be the most important budgeting responsibility.

Three additional categories not identified by IFMA: Rapidly changing information technology and other environmental factors have affected the organizations' structures and created new demands for buildings and the related work environment. Efficient implementation of facility management responsibilities has been required to cope with these changing organizational demands. Therefore, this research identified 12 issues that may have substantial and far-reaching effects on decisions of facility management professionals

Table 9
Frequencies and Percentages of Articles by Secondary Categories for Maintenance and Operations

Categories	Frequency	Percentage[1]	Percentage[2]
Exterior maintenance	4	10.81	1.47
Breakdown maintenance	5	13.51	1.83
Preventive maintenance	5	13.51	1.83
Maintenance of finishes	9	24.32	3.30
Landscape maintenance	0	0.00	0.00
Housekeeping	1	2.70	0.37
Trash removal	0	0.00	0.00
Hazardous waste disposal	0	0.00	0.00
Energy management	13	35.14	4.76
Total	37	100.00	13.55

Table 10
Frequencies and Percentages of Articles by Secondary Categories for Budgeting

Categories	Frequency	Percentage[3]	Percentage[4]
Capital	11	45.83	4.03
Operating	1	4.17	0.37
Furniture	8	33.33	2.93
General[5]	4	16.67	1.47
Total	24	100.00	8.79

[1] % on the basis of frequency by category, N=37
[2] % on the basis of total, N=273
[3] % on the basis of frequency by category, N=24
[4] % on the basis of total, N=273
[5] General information related to primary category of Budgeting (not included in secondary categories)

as related to organizational changes, technological changes, and implementation changes. They represent the pressures to which facility managers must respond for the efficiency and flexibility of their functions, and for the productivity of employees. These selected issues which were not identified in the original IFMA classification were categorized into three primary categories (organization, office technology, and implementation of facility management) and used as three primary categories not identified by IFMA for this study. The description and classification of these issues are shown in Figure 6.

The 12 issues can be classified into: (1) organization, (2) office technology, and (3) implementation of facility management issues. Organization related issues encompass employees, the nature of their work, and the work environment. Office technology includes the use of computers, microelectronics, telecommunication, and related areas. Finally, implementation of facility management issues addresses who usually implements the facility management responsibilities in an organization.

In this study, 140 of the articles reviewed were coded into these categories. The data in Table 11 show how the frequency of articles related to each issue changed, and the relationship among the issues over the time period studied. The majority of the articles related to the broad category of office technology. Specifically, the most frequently discussed issues were systems furniture (N=25 or 17.86% of the total 140 articles), wire management (N=22 or 15.71% of the total), and the environment (N=20 or 14.29% of the total). A discussion of these individual issues and each of the three categories follows.

1. Organization related issues: Of the 140 feature articles, 33 articles (23.57%) dealt with the organization related issues. According to Table 11, articles concerning the environment, that is the work environment, (N=20 or 60.60% of the topical) appeared most frequently among the issues related to this category. This may indicate the organizations' increasing concern for their employees' health and the relation between worker productivity

Table 11
Frequencies of Articles Related to Three Categories Not Identified by IFMA and Related Issues by Year

Categories	Year 84	85	86	87	88	89	90	91	Frequency	Percentage[1]	Percentage[2]
Organization									**33**	**100.00**	**23.57**
Space/Furniture standard	1	0	2	1	2	0	0	1	7	21.21	5.00
Centraization	1	1	0	0	0	0	0	2	4	12.12	2.86
Internationalization	0	0	0	0	0	1	0	1	2	6.06	1.43
Environment	2	2	2	2	1	3	4	4	20	60.61	14.29
Office Technology									**97**	**100.00**	**69.29**
Information technology	5	1	2	4	0	0	0	0	12	12.37	8.57
Wire management	2	3	2	3	3	3	4	2	22	22.68	15.71
System furniture	4	2	5	2	2	4	5	1	25	25.77	17.86
Building Automation Syndrome (BAS)	3	3	3	3	3	1	1	1	18	18.56	12.86
Computer-Aided Design (CAD)/CAFM	3	0	3	4	1	5	3	0	19	19.59	13.57
Computer Integrated facility Management (CIFM)	0	0	0	0	1	0	0	0	1	1.03	0.71
Implementation of Facilitiy Management									**10**	**100.00**	**7.14**
In-house	2	1	2	1	0	0	0	0	6	60.00	4.29
Consultant	0	0	0	1	0	0	2	1	4	40.00	2.86
									140		**100.00**

[1]% on the basis of frequency by each category
[2]% on the basis of total, N=140

and the work environment.

2. Office technology related issues: As shown in Table 11, articles considering the office technology related issues appeared most frequently, 97 articles or 69.29% of the total 140 articles. This may suggest that office technology is used at every level in an organization, and changes in office technology may have great impact on facilities and facility management of an organization. Among the related issues, the articles considering the issues of systems furniture (N=25 or 25.77% of the topical articles), wire management (N=22 or 22.68% of the topical), CAD/CAFM (N=19 or 19.59% of the topical), and BAS (N=18 or 18.56% of the topical) appeared most frequently.

As shown in Table 11, systems furniture (N=25) has been a major issue. The development of systems furniture can be seen as one result of changing information technology; it help the offices remain flexible to accommodate future changes.

According to Table 11, the importance of wire management (N=22), that is management of communication media, has been emphasized most frequently and continuously to facilitate office flexible for the changing organizational structures. With increasing office technology, more wires and cables need to be installed and connected. Therefore, to be efficient in redesigning and replanning, the tangle of the wires has to be under control.

According to the data in Table 11, articles addressing the CAD/CAFM issue (N=19) also appeared with great frequency. As information technology and organizations develop over time, different types of environment and methods of facility management are needed in response. CAD/CAFM can be considered as an applied information technology that significantly affects facility management.

The issue of BAS (N=18) has been discussed very frequently. (See Table 11.) As the information technology and organizational demands are increased, the buildings cannot be static any more. The data suggest that today's offices cannot cope with varying and

increasing organizational changes without incorporating advanced information technology into building systems.

3. Implementation of facility management: According to the data in Table 11, 10 articles or 7.14% of the total 140 articles dealt with implementation of facility management. As shown, in the early part of the period studied (1984-87), more articles considered the implementation of facility management tasks by an in-house staff while in the latter part of the period (1987, 1990, and 1991) the contribution of consultant services was considered. This may suggest that, as information technology and organizations change, the decisions about facilities are no longer considered simple factors such as image or cost. As the decisions became more complex, organizations need specialized skills and knowledge to cope with the continuously evolving technology, as well as appropriate method to control personnel costs.

Discussion

In this study, the Facility Design & Management journal was examined to identify the historical trends in articles relative to industry identified facility management responsibilities. The study has produced several findings.

The study provided information on the practices of those involved in facility management. It also identified what kinds of responsibilities are becoming important, and identified a new evolving responsibility which was not included in the original list, but was represented by the articles. It also suggested required tools and techniques for professional development to efficiently respond to the changing responsibilities. This study also provided insight to the areas of study which an educational program in facility management might include.

Practices in facility management: Rapidly advanced information technology and changing environmental factors have affected the organizations' structures and created new

demands for buildings and work environment, that is facilities. The organizations have been through numerous changes of equipment, and office redesigning and replanning. From the responsibilities identified, interior planning (N=65 or 23.81%), interior installation (N=38 or 13.92%), architecture and engineering services (N=28 or 10.26%), and space management (N=17 or 6.23%) can be considered as planning and design-related categories. Since 148 articles, or 54.22% of the total 273 articles dealt with these categories, the planning and design-related responsibilities seem to be the most common topic for Facilities Design & Management articles. This seems to support the conclusion that the planning and design-related responsibilities have been the major tasks of facility management departments. Furthermore, since the primary responsibility categories of interior planning (N=65 or 23.81%) and interior installation (N=38 or 13.92%) were addressed by 103 articles, or 37.73% of the total articles, these functions could be considered as one of the most important tasks of facility managers.

When secondary categories were considered, in the primary category of interior planning (N=65), the most frequent articles addressed furniture specification and provided specific information on new furniture, furnishings, or equipment (N=23 or 35.38% of the topical articles). (See Table 6.) This suggests that, as the environment, especially technology changes, and the organizations' demands for the furniture, furnishings, and equipment change, facility managers need continuous information to accommodate the changes efficiently.

Twelve articles dealt with the issue of employee satisfaction evaluation representing 31.58% of the articles related to the primary category of interior installation (N=77). (See Table 7.) The needs of employees have become a large factor in the process of the design of the office environment.

The primary category of long-range planning was the least emphasized responsibility among the IFMA responsibility list. Only six articles (2.20% of the total 273 articles) dealt

with this topic. The lack of articles may suggest that, even though long-range planning in facility management is important, proper long-range planning becomes more difficult as environmental, especially technological, changes are so rapid that managers cannot predict the needs for facilities.

When the three categories not identified by IFMA were considered, 97 articles, or 69.29% of the 140 articles were attributable to the office technology related category. This may indicate that office technology has a great impact on facilities and facility management. The issues of systems furniture (N=25) which represented 25.77% of the topical and 17.86% of the total 140 articles, and wire management (N=22) which represented 22.68% of the topical and 15.71% of the total, appeared most frequently. As offices are refitted to accommodate advanced and changing environmental factors, more cables and more connections are needed in response to the increasing new equipment. This advanced technology needs flexible wire management with innovative solutions.

Evolving responsibilities Changing cost for space which is affected by technological change, competition, and increasing concern for worker demands have affected the responsibilities of facility management and the professionalization of the area. Thirty-two articles, or 11.72% of the total 273 articles, emphasized general facility management skill, and there was a sharp increase in the number of articles on the topic in 1991. Although general facility management skill is not included in the IFMA list, the results of this study suggest that the general skill becomes an important responsibility. This suggests that, even though planning and design related practices are the most common tasks for facility managers, without integrative facility management skill and knowledge, efficient and effective facility management cannot be expected.

The increasing importance of this evolving responsibility was further supported by the number of articles related to the researcher developed category of implementation of facility management. The practice of performing facility management functions with in-

house staff has changed. As environmental factors, especially technology, change rapidly, the decisions about facilities have become more complex and require more specialized skills. The trend has changed toward performing more functions with consultants. This practice provides needed specialized skill while representing a control on personnel costs.

In this study, the issue of implementation of facility management by consultants appeared more frequently in the latter review period than did articles related to in-house functions. (See Table 11.) This may indicate that as facility management skill and procedures necessary for the organization's efficient use of facilities become more complex, the use of consultants will increase.

The least written about topic (N=4 or 1.47% of the total 273 articles) dealt with facility management issues in foreign countries. This is apparently not an evolving issue in facility management. However, its inclusion did facilitate a more complete categorization of articles for the purpose of the study.

Professional development: Organizations recognize that people costs are a major part of their operating cost and that employee performance is affected by the work environment. In the category of interior installation (38 articles, or 13.92% of the total 273 articles), it is important to note the article frequencies for the topics of employee satisfaction evaluation (N=12 or 31.58% of the topical). This trend supports the concern that design evaluation (N=9 or 23.68% of the topical) support that the design of the work environment has an effect on employee performance, and suggests that the management technique for developing an effective post-occupancy design evaluation is required. Therefore, additional professional development in these areas is indicated.

Advanced personal computers provide a cost-effective CAD/CAFM. CAD/CAFM received much interest as a tool for the entire process of facility management. When the three categories through the analysis were considered, 19 articles, or 13.57% of the total 140 articles, dealt with the CAD/CAFM issue. Articles or an article related to the issue of

Computer Integrated Facility Management (CIFM) first appeared in 1988. This may suggest that there will be a trend toward the integration of functions previously performed manually or by individual automation into new comprehensive systems.

Furthermore, 18 articles, or 12.86% of the total 140, dealt with the BAS issue. The finding may suggest that advanced computer technology is handling building functions for energy management, security, and safety. With continued development of office technology, the accuracy of building automation has increased. The use of computer technology has become a necessary tool for facility management. Therefore, facility managers should have knowledge related to this tool and should continuously gather information to efficiently cope with the changes in computer technology.

Educational programs: There have been disparities between educational preparation and professional practices in the field of facility management. That is, facility management education is not yet providing fully what facility managers need to know in their professional practice (Flaherty, Wise, and Wise, 1990). Several findings of this study suggest the areas of study which an educational program in facility management might include.

The planning and design-related responsibilities (N=148 or 54.22% of the total 273 articles) have been the most common topic for the journal articles. This suggests that facility managers must have skills and knowledge in the planning and design-related areas.

There was increased concerned for the topic of real estate in 1987. These interests seem to have resulted from the implementation of the Tax Reform Act in 1986. (See Table 2.) This suggests that the knowledge of corporate tax law is a recommended competency for a facility manager.

Among the sub-topics of the budgeting category (N=24 or 8.79% of the total 273 articles), the issue of capital budgeting (N=11) which represented 45.83% of the topical and 4.03 % of the total articles appeared most frequently. Capital budgeting is the procedure

that justifies an expenditure by proving the benefits; a procedure which requires accounting and corporate financial skill. A facility manager must be skilled in these areas.

As discussed previously, computers were increasingly used in facility management. CAD/CAFM and BAS, and advanced computer technology is continuously evolving. Therefore, a facility manager should have knowledge related to computer technology.

As environmental factors have rapidly changed, the functions of facility management have become increasingly complicated. As a result. the concern for general facility management knowledge increased. This was coupled with increased concern for the incorporation of employees' opinions in the process of facility management. Therefore, a facility manager must have management knowledge related to organizations and human resources.

In summary, a well-rounded educational program should include not only design and planning related courses, but also business courses such as tax law, accounting, and finance. Management courses related to organizations, as well as management of human resources would contribute to the increasing emphasis on general facility management knowledge as well as the growing concern for employee satisfaction. CAD and other computer related courses are essential for developing the computer skills necessary to competently use programs for design, business, and management functions.

Summary

From the results of this study, several findings were identified. First, planning and design-related responsibilities seemed to be the major tasks of the facility management department; long-range planning was the least emphasized responsibility on the IFMA responsibility list. When the three categories not identified by IFMA were considered, the office technology related category was most emphasized as a major task of the facility management department. Second, general facility management skill was identified as an

important responsibility. Third, management techniques for developing a proper post-occupancy design evaluation appears to be required of facility managers; computer technology has become an increasingly important tool in the facility management department. Finally, a well-rounded educational program should include not only design and planning-related courses, but also business, management, and computer related courses.

Chapter V

Summary, Implications, and Recommendations

Summary

The purpose of this study was to identify historical trends relative to industry identified facility management responsibilities by matching the key issue of each feature article represented by a journal, Facilities Design & Management, with the responsibilities list outlined by IFMA in an effort to produce descriptive information about these trends. Content analysis was selected as a methodological tool.

The sample for this study included all the feature articles of each magazine issue published between January 1984 and October 1991. All 413 feature articles were included in this analysis. The instrument categories included 10 primary categories for 273 articles and consisted of 8 categories outlined by IFMA and 2 developed by the coder from the literature review, 39 secondary categories outlined by IFMA, and 12 issues classified into three primary categories developed by the coder during the process of coding the data for the remaining 140 articles. (See appendix B.)

The data were collected by reviewing titles and abstracts of all the feature articles of the journal and matching the key issues presented with the most appropriate primary and secondary categories following the definition defined by IFMA. New categories were developed for the purpose of clearly categorizing articles which did not lend themselves to classification under IFMA defined categories. The data were processed by the SAS computer program.

Ten primary categories: These consisted of eight categories outlined by IFMA and two developed by the coder. Articles related to interior planning represented the largest single category (N=65 or 23.81% of the total 273 articles) over the years studied. (See Table 2 and Figure 7.) Combining four of the primary categories revealed that 148 articles,

representing 54.22% of the total 273 articles, related to planning and design. Specifically, articles related to interior planning (N=65 or 23.81%), interior installation (N=38 or 13.92%), architecture and engineering services (N=28 or 10.26%), and space management (N=17 or 6.23%) could be summarized under this broad responsibility.

Of the 140 articles coded within the three new categories identified by this study, the most frequently discussed issues were systems furniture (N=25 or 17.86% of the total 140 articles), wire management (N=22 or 15.71% of the total), environment (N=20 or 14.29% of the total), CAD/CAFM (N=19 or 13.57%of the total), and building automation system (N=18 or 12.86% of the total).

Each IFMA outlined and the two researcher developed categories will be summarized briefly.

1. Facility management: Facility management (N=32 or 11.72% of the total 273 articles) as an independent management skill and profession has been continuously emphasized.

2. Facility management in foreign countries: Four articles, or 1.47% of the total 273 articles dealt with facility management issues in foreign countries. This finding and the omission of this responsibility from the IFMA list suggest that this topic is not of major concern to most facility managers.

3. Real estate: Twenty-two articles, or 8.06% of the total 273 articles dealt with the issue of real estate. The articles seem to indicate that the property disposal function is the most important facet of the real estate related responsibilities.

4. Long-range planning: Only six articles, or 2.20% of the total 273 articles dealt with the issue of long-range planning and this was the least discussed among the IFMA outlined responsibilities. This suggests that, even though facility management has grown as a profession, it has not been fully integrated into organizational strategic planning.

5. Space management: Seventeen, or 6.23%, of the total 273 articles dealt with the

topic of space management. Eleven articles, which represented over half (64.71%) of the articles related to space management, focused on space allocation. This may suggest the increasing importance of effective use of office space due to the rising cost of space.

6. Interior planning: Sixty-five articles related to the interior planning category, or 23.81% of the total 273 articles, making this the largest single category. Most of the interior planning functions were emphasized continuously throughout the period studied. The topic of furniture specification (35.38%) which addressed specific information on new furniture, furnishings, or equipment, was the most frequently identified secondary category. This suggests that facility managers need continuous information related to evolving facilities to accommodate the rapidly changing environment.

7. Interior installation: Articles related to the topic of interior installation (N=38, or 13.92% of the total) represented the second most frequently addressed topic during most of the review period. The secondary category of employee satisfaction evaluation with their work environment (N=12 or 31.58% of the topical 38 articles) appeared most frequently. This suggests that, to be successful in interior planning and in facility management, responsible planners should be concerned about the design and planning process. The evaluation method could be considered one of the most effective methods for incorporating employees' opinions.

8. Architecture and engineering services: Twenty-eight articles, or 10.26% of the total 273 articles dealt with the issue of architecture and engineering services. This were ranked in fifth position in total frequencies. Seventeen articles, or 60.71% of the topical articles, dealt with the sub-topic of construction management. This suggests that, although there has been a domestic construction slump, articles related to administration and management of new construction have sustained interest.

9. Maintenance and operations: Thirty-seven articles, or 13.55% of the total 273 articles, dealt with the responsibility of maintenance and operations. The issue of energy

management (N=13 or 35.14% of the topical) appeared most frequently among the secondary categories related to this topic.

10. Budgeting: Twenty-four articles, or 8.79% of the total, dealt with the topic of budgeting. Among the related secondary categories, the issue of capital budgeting (N=11 or 45.83% of the topical) appeared most frequently. This suggests that capital budgeting is the most important budgeting responsibility and facility managers should have training in the necessary capital budgeting techniques.

Three primary categories not identified by IFMA: Of the 140 articles coded within 12 sub-categories related to the three primary categories resulted from the data coding process, the most frequently discussed issues were systems furniture (N=25 or 17.86% of the total 140 articles), wire management (N=22 or 15.71% of the total), environment (N=20 or 14.29% of the total), CAD/CAFM (N=19 or 13.57% of the total), and BAS (N=18 or 12.86% of the total). Each will be summarized briefly within each related primary category.

1.Organization related issues: Of the 140 articles, 33 articles, or 23.57% of the total 140 articles, dealt with the organization related issues. According to the data shown in Table 11, articles concerning work environment (N=20 or 60.61% of the topical articles) appeared most frequently among the issues related to this category. This may indicate an organization's recognition of the close relationship between work environment and productivity, and an organization's increasing concern for their employees' welfare.

2. Office technology related issues: Ninety-seven articles, or 69.29% of the total 140 articles dealt with the office technology related issues. Among the sub-issues related to this category, articles related to the issues of systems furniture (N=25 or 25.77% of the topical), wire management (N=22 or 22.68% of the topical), CAD/CAFM (N=19 or 19.59% of the topical), and BAS (N=18 or 18.56% of the topical) appeared most frequently.

Emphasis on the articles related to systems furniture and wire management may

suggest that flexibility of installation in office design and planning became increasingly important due to a rapidly changing environment. The frequency of articles related to the issues of CAD/CAFM and BAS may suggest the necessity of computer technology to facility management functions.

Implications

The findings of this study are useful as a description of important practices and new evolving responsibilities in facility management. They may help facility managers prepare for organizational changes more proactively by providing insight on responsibilities which have become increasingly important. Likewise, results of the analysis can suggest required tools and techniques which are essential to a facility management professional. Finally, the results offer insight on required education to better prepare professionals for the future.

Practices in facility management Information technology and other environmental changes all contribute to the changes in organizational structures and the way a facility is managed. As the demand of organizations for their facilities and work environment rapidly change, the responsibilities related to design and planning will become more important. In the process of design and planning, employee satisfaction with work environment and flexibility of installation should be considered to efficiently cope with the coming changes. As the demands of employees have become a primary factor in the process of design and planning of the office environment, facility managers need technical skills as well as a new understanding of how the work environment affects workers' motivation, performance, satisfaction, and productivity.

As supported by the findings, the growing awareness of the interaction between facilities and the workplace environment will likely continue. The continuous evaluation function of facility managers will become more important as they work to reduce the problems due to improper work environment and to increase employee satisfaction with the

work environment. A continuous evaluation would be made of building efficiency, organizational productivity, and employees' response to the environment. Flexibility of interior installation and planning also should be considered to cope with future changes. Therefore, the importance of wire management and the use of systems furniture will likely increase.

Evolving responsibilities: General skill and knowledge related to facility management will be necessary to efficiently deal with the various aspects of the facility management function. Therefore, the general facility management skill could be considered as an evolving responsibility in facility management.

Professional development: More organizations seem to be interested in the relation between employees and the work environment. The implication is that additional professional development in these areas is indicated to facilitate effective evaluation methods which reflect employee opinions.

Applied information technology will be used more as a methodological and administrative tool. CAD/CAFM will be used by more managers as an effective methodological tool. There may be a trend toward CIFM, and this will help facility managers to manage their diverse functions more efficiently.

Educational program: The planning and design-related responsibilities are the most common tasks of the facility management department according to the study. Therefore, a knowledge and skill of design and planning-related areas are necessary for facility managers.

The tax system is very closely related to the real estate interests of an organization. The changes in the tax system may require many adjustments in the way organizations make real estate investment decisions. A knowledge of real estate and tax law will be important to facility managers as they contribute to these organizational decisions.

Capital budgeting represents one of the most important areas in all of corporate

budgeting. Failure to make capital expenditure decisions using sound capital budgeting techniques will impede productivity and profitability. Accounting and financial skills are necessary for facility managers to defend the benefits of expenditures, and eventually to increase organizational profitability.

The use of information technology has increased, and become more sophisticated. The process of facility management has become more complicated and diversified. Therefore, facility managers must be familiar with computerized facility planning and building systems techniques. The knowledge of computer systems is becoming necessary for facility managers living in an information age.

Recommendations

Organizations have realized that employee costs are the most important factor in workplace operating cost. The workers' behavior, performance, satisfaction, and productivity are very closely related to the work environment. Therefore, facility managers should gather information about how the planning, design, and management of the workplace affects people and organizations. This study revealed an emphasis on employee satisfaction evaluations; these evaluations are one method for gathering information on the relationship between people and the work environment. Further research is needed to identify ways to effectively use and apply the information gained from workers, and to examine the impact of the work environment on workers.

Another recommendation for further research would be to narrow the focus of the responsibility categories to explore particular types of products or methods of management with relation to the issues presented. Other journals directed at the profession could be analyzed to discover whether or not the results are consistent with a different sample.

For practitioners: Facility planning and management has become increasingly professionalized in the corporate sector. Corporations have realized that their facilities are a

substantial portion of their total assets. They have also realized that their facilities can have a substantial effect on organizational and individual productivity. Therefore, facility planning and management should be integrated into corporate long-range strategic planning. Thus, more emphasis on the long-range planning of facility management is recommended.

Increasing problems with environmental issues may require more effective and efficient preventive maintenance as a facility management function. Therefore, to prevent problems and to increase the workers' productivity, efficient preventive maintenance methodologies should be studied and emphasized.

For educators: There have been disparities between educational preparation and professional practice across the entire field of facility management. Therefore, a more systematic and practical approach needs to be considered in the design of a facility management education program. Trends from this study suggest that (1) design and planning-related responsibilities were the most important tasks of facility managers, (2) tax law was related to real estate and space management options, (3) capital budgeting was the most emphasized budgeting function, and (4) computers were increasingly used in a variety of facility management applications. Therefore, it is recommended that the facility management program include design and planning-related courses, real estate and tax law, accounting and finance, and CAD or other computer related courses. Due to the increasing emphasis on general management skill and concern for people, it is also recommended that the education program include and emphasize human resource management as well as organizational management.

Reference

Becker, F., & Sims, W. (1986). Mastering the baffling art of long-range strategic planning. Facilities Design & Management, 5(2), 68-73.

Berelson, B. (1952). Content analysis in communications research. New York: Free Press.

Brigham, E. F. & Gapenski, L. C. (1991). Financial management: Theory and practice (6th ed.). FL: The Dryden Press.

Brill, M., Margulis, S., Konar, E., & BOSTI. (1984). Using office design to increase productivity, 1. Buffalo, NY: Workplace Design and Productivity.

Brunner, J. A., & Bennet, G. F. (1976). Coping with the energy shortage: Perceptions and attitudes of metropolitan consumers. Journal of Environmental Systems, 6(3), 253-284.

Canter, D. V. (1977). The psychology of place. New York: St. Martin's Press.

Chung, K. H. (1977). Motivational theories and practices. Columbus: Grid, Inc.

Churns, A. (1976). The principles of sociotechnical design. Human Relations, 29(8), 783-792.

Cuniff, J. (1978). Economic wonder cure: Strengthen productivity. Associated Press Wire Service.

Dimkoff, G. K. (1985). Can you dollar-justify facilities programs? Facilities Design & Management, 4(8), 92-95.

Dugas, E. (1986). Placemaking. What's Next for Facility Management?, 1. Ann Arbor, Mich.: Quorum, Inc.

Flaherty, T. M., Wise, J. A., & Wise, B.K. (1990). A facilities management educational survey: Matching the university with industry needs. The Center for Integrated Facilities Research, Grand Valley State University.

Frances, J. (1986). Office productivity: Contributions of the physical setting. Technical Report, 13. Champaign, Illinois: CERL (Construction Engineering Research Laboratory).

Greenhalgh, L., & Rosenblatt, Z. (1984). Job insecurity: Toward conceptual clarity. Academy of Management Review, 9(3), 438-448.

Grey, F. J., & Kania, K.A. (1986). Real estate is prime war zone in the tax reform onslaught. Facilities Design & Management, 5(9), 84-87.

Hedge, A. (1990). Sick building syndrome correlates with complex array of factors. Facility Management Journal, January/February, 52-58.

Helwig, J. T. (1978). SAS introductory guide. SAS Institute Inc.

Herzberg, F. (1959). Motivation to work. New York: John Wiley & Sons.

Holsti, O. R. (1969). Content analysis for the social science and humanities. Reading, MA: Addison-Wesley.

IFMA. (1984). The IFMA report #1. Ann Arbor, Mich.: International Facility Management Association.

IFMA. (1986). The IFMA report #2. Ann Arbor, Mich.: International Facility Management Association.

Jean, S. (1990). Computerized maintenance management. Building operating Management, 37(2), 48-50.

Kirsch, K. C. (1985). 10 Sure-win ways to sell the boss your facilities plan. Facilities Design & Management, 4(4), 95-97.

Klingmann, H. D., Mohlar, P. P., & Weber, R. P. (1982). Cultural indicators based on content analysis. Quality and Quantity, 16, 1-18.

Krippendorff, K. (1980). Content analysis: An introduction to its methodology. Beverly Hills, CA: Sage.

Locke, L. F. (1976). Proposals that work: A guide for planning research. New York: Teachers College Press.

Maslow, A. H. (1954). Motivation and personality. New York: Harper.

Naisbitt, J. (1982). Megatrends: Ten new directions transforming our lives. New York: Warner Books.

Namenwirth, J. I., & Lasswell, H. D. (1970). The changing language of American values: A computer study selected party platforms. Berverly Hills, CA: Sage.

O'Tool, J. (1986). The integrative nature of facility management. What's Next for Facility Management?, 2. Ann Arbor, Mich.: Quorum Inc.

Pava, C. (1986). Redesigning sociotechnical systems design: Concepts and methods for the 1990s. The Journal of Applied Behavioral Science, 22(3), 201-221.

Pavlov, I. P. (1960). Conditioned reflexes: An investigation of the physiological activity of the cerebral cortex. New York: Dover Publications.

Peroustians, A. A. (1988). Technology --- its impact on facility management. IFMA Journal, winter, 10-15.

Piper, J. (1990). Retrofit's first step: Facility assessment. Building Operating management, 37(2), 58-64.

Rosengreen, K. E. (1981). Advances in content analysis. Berverly hills, CA: Sage.

Salustri, J. (1985). Guidelines for measuring productivity. Facilities Design &Management 4(2), 114-117.

Sanzotta, D. (1977). Motivational theories & applications for managers. New York: AMACOM.

Sena, M. L., & Teicholz, E. (1986). Computers: Facilities management is fertile ground for automation. Architectural Record 174(2), 35-39.

Shear, M. A. (1983). Building maintenance management NJ: Englewood Cliffs.

Shnipper, S. (1985). Productivity hikes demand painstaking synergism. Facilities Design & Management, 4(2), 110-113.

Special Report. (1990). Survey of the interior design profession. Facilities Design & Management, 9(10), 79-81.

Springer, T. J. (1982). VDT workstations: A comprehensive evaluation of alternatives. Applied Ergonomics, 13, 211-212.

Springer, T. J. (1986). Improving productivity in the workplace: Report from the field. IL: Springer Associates Inc.

Steele, F. I. (1973). Physical settings and organizational development. Menlo Park, CA: Addison-Wesley.

Sundstrom, E., Burt, R., & Kamp, D. (1980). Privacy at work: Architectural correlates of job satisfaction and performance. Academy of Management journal, 23(1), 101-117.

Sundstrom, E., Herbert, R. K., & Brown, D. W. (1982). Privacy and communication in an open plan office: A case study. Environment and Behavior, 14, 379-392.

Sullivan, E. (1990). HVAC challenge: Responding to concerns about the environment. Building Operating Management, 37(6), 26-34.

Tapscott, D. (1982). Office automation: A user-driven method. New York: Plenum Press.

Teicholz, E. (1987). A watchful eye on A-E-C. Computer Graphics World, 10(2), 91-94.

Thomas, M. (1984). Xerox's office 88 study: Misapplied technology will stifle productivity. Facilities Design & Management, 3(4), 86-89.

Trist, E. L., & Bamforth, K. (1951). Some social and psychological consequences of the long-wall method of coal getting. Human Relations, 4, 3-39.

United States Department of Labor. (1991). Employment and Earnings, 38(9). Washington, DC: Bureau of Labor Statistics.

Vroom, V. H. (1964). Work and motivation. R. E. Krieger Publication.

Weber, R. P. (1984). Content analysis: A short primer. Quantitative Sociology, 7, 126-147.

Webb, E. J., Campbell, D. T., Schwartz, R. D., & Sechrist, L. (1966). Unobtrusive measures: Nonreactive research in the social sciences. Chicago: Rand McNally.

Williams, C. (1986). Can and should we define facility management? What's Next for Facility Management? 1. Ann Arbor, Mich.: Quorum, Inc.

Zweers, T., Skov, P., Valdjorn, O., & Molhave, V. (1990). The effect of ventilation and air pollution on perceived indoor air quality in five town halls. Energy and Buildings, 14, 175-181.

Appendix A

Description of Primary & Secondary Facilities Management Responsibilities

I Facility Management : The wide range of skills and procedures necessary to make effective use of the office environment and to meet changing organizational objectives in the future

II Foreign : Facility management in the foreign countries

III Real Estate
Building acquisition-purchase
Building acquisition-lease
Site selection
Site acquisition
Property disposal-land, buildings, leaseholds
Out leasing

IV Long-Range Planning
Developing long-range facilities plan (1-3 years)
Developing long-range facilities plan (3-10 years)
Developing long-range facilities plan (10+ years)

V Space Management
Space allocation-developing corporate standards for space allocation, allocating space to departments and divisions
Space inventory-space inventory and analysis
Space forecasting-forecasting space needs

VI Interior Planning
Planning-initial planning and designing of interiors
Replanning-subsequent replanning and redesigning of interiors
Furniture specification-specifying and purchasing furniture and furnishings
Major changes-changes costing more than $1,000

VII Interior Installation
Furniture installation-furniture installation crew
Furniture moving-moving crew
Furniture maintenance-maintenance of furniture and furnishings
Furniture inventory-managing an inventory of furniture, furnishings or equipment
Minor changes-changes costing less than $1,000
Design evaluation-evaluating facility design and programming
Employee satisfaction evaluation-evaluating employee satisfaction with the environment

VIII Architecture and Engineering Services
Architectural design-architectural design of acquisition and improvements
Systems design/Building programming
Code compliance-permits, code compliance, regulatory compliance
Construction management-administration and management of construction

IX Maintenance and Operations
Exterior maintenance-maintenance of facility shell
Breakdown maintenance-breakdown maintenance of electrical, HVAC (Heating, Ventilation, and Air Conditioning), etc. systems
Preventive maintenance-preventive maintenance of electrical, HVAC, etc. systems
Maintenance of finishes-maintenance of interior finishes
Landscape maintenance-landscape and ground maintenance
Housekeeping-cleaning and housekeeping
Trash removal
Hazardous waste disposal-hazardous waste removal
Energy management-energy conservation program

X Budgeting
Capital-writing facilities capital budget
Operating-writing facilities operating budget
Furniture-writing facilities budget for furniture

Appendix B

Coding Instrument

1-2 Year:

3-4 Volume:

5-6 Number:

7-9 Page:

11-12 Primary Category:	[1](FM) Facility Management
	[1](FR) Foreign
	[2](01) Real Estate
	[2](02) Long-Range Planning
	[2](03) Space Management
	[2](04) Interior Planning
	[2](05) Interior Installation
	[2](06) Architecture and Engineering Services
	[2](07) Maintenance and Operations
	[2](08) Budgeting
14-15 Secondary Category:	[3](11) Building acquisition-purchase
	(12) Building acquisition-lease
	(13) Site selection
	(14) Site acquisition
	(15) Property disposal
	(16) Out leasing
	(21) Developing one to three year plans
	(22) Developing three to ten year plans
	(23) Developing ten-plus year plans
	(31) Space allocation
	(32) Space inventory
	(33) Space forecasting
	(41) Planning
	(42) Replanning
	(43) Furniture specification
	(44) Major changes
	(51) Furniture installation
	(52) Furniture moving
	(53) Furniture maintenance
	(54) Furniture inventory

[1]Primary categories developed in the present study
[2]Primary categories outlined by IFMA
[3]First digit represents the number of primary category

(55) Minor changes
(56) Design evaluation
(57) Employee satisfaction evaluation
(61) Architectural design
(62) Systems design/Building programming
(63) Code compliance
(64) Construction management
(71) Exterior maintenance
(72) Breakdown maintenance
(73) Preventive maintenance
(74) Maintenance of finishes
(75) Landscape maintenance
(76) Housekeeping
(77) Trash removal
(78) Hazardous waste disposal
(79) Energy management
(81) Capital
(82) Operating
(83) Furniture

17-18 New Category:

(01) Space/Furniture standard
(02) Centralization
(03) Internationalization
(04) Environment
(05) Information technology
(06) Wire management
(07) Systems furniture
(08) Building Automation System (BAS)
(09) Computer-Aided Design (CAD)/Computer-Aided Facility Management (CAFM)
(10) Computer Integrated Facility Management (CIFM)
(11) In-house
(12) Consultant

Vita

Keum-Jung Lee was born in the Republic of Korea, on July 13, 1964. She attended Yonsei University and received her Bachelor of Science degree in English Literature in February, 1986. After graduation, she entered the graduate program in Facility Management in Housing, Interior Design, and Resource Management, College of Human Resources at Virginia Polytechnic Institute and State University

Keum-Jung Lee